

# MARINE REVIEW

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No. 15

## PROPOSED COMBINATION OF LAKE SHIP OWNERS.

In the past few years the so-called independent vessel owners of the lakes—those who have no connection with the ore companies or railroads—have made several attempts to pool their interests or enter into agreements relating to freights. All movements of this kind have failed. On Wednesday of this week, however, a meeting was held in Cleveland and initial steps taken for the formation of an organization that may be effective. There was certainly more enthusiasm and more show of earnestness than has ever existed on similar occasions in the past. It was shown that the number of owners required to enforce the payment of profitable rates is much smaller than in the past and is getting smaller each year; that in fact less than twenty of the larger fleets could hold out for fixed rates and enforce their demands.

Extended discussion at the meeting brought out the fact, already well known of course, that with the present outlook for business there is far more vessel capacity than will be required for the coming season; that the individual owner will get, as far as the ore trade is concerned, only what is left after the United States Steel Corporation fleet and other vessels owned by the ore companies are provided for, and that these vessels going up the lakes light will move in a full season more than 11,000,000 tons of ore. It was further evident that in view of contracts made some time ago with the Rockefeller fleet at 50 cents a ton free, which would mean about 70 cents including the unloading charge, an effort would be made by the ore shippers to close season contracts at about that same figure. This would mean very slim profit for the best of the steel freighters, with no chance of profit at all for the smaller vessels unless they were favored by much higher coal freights than are expected.

The natural conclusion is that a combination on the part of the individual owners is their only redemption. The outlines of an organization to control freights were accordingly planned. A board of directors of fifteen owners from different ports around the lakes was selected, and it was agreed by those present that for ten days, pending the perfection of details, no ore business should be accepted at less than 90 cents from the head of Lake Superior, 80 cents from Marquette and 70 cents from Escanaba, and no coal at less than 50 cents to either lake Michigan or Lake Superior ports. It is proposed now to bring this board of directors together in Cleveland as soon as possible and from them select a small executive committee that will be given full power to act promptly on all business that may be offered to the ships. According to the scheme a commissioner, or general manager, will be appointed at a liberal salary and through his hands all contracts or charters must pass. The broker is not to lose his place in representing the ships with which he has dealings, but all his charters must be made through the commissioner. The plan as regards season contracts is to pro rate all such business among members of the organization. Such a scheme could, of course, be carried out if honestly entered into by even half of the individual owners. A few vessel managers say they will stand by the organization even though they are supported by not more than a dozen of the big fleets. The success or failure of the movement will undoubtedly be speedily determined, as it is probable that ore shippers will be selling their product quite largely within the next two weeks and will soon take up the question of lake freights.

## STEEL CORPORATION APPOINTMENTS.

The announcement, immediately following the first meeting of directors of the United States Steel Corporation, that James Gayley of the Carnegie Co. had been elected first vice-president in charge of mines and docks of all the companies is of special interest in the great lakes region, as it means that he is to be the active head of all matters pertaining to raw material in the big organization; that he is to have charge of the vast iron mining and transportation interests and that naturally the present Carnegie organization will predominate on the lakes. Mr. Gayley was for some time in charge of ore and blast furnace matters for the Carnegie Steel Co., and was later given supervision of the iron mining, dock and vessel interests of the company. As regards the ships—112 steel vessels owned by the corporation—no announcement has been made as yet, but Mr. Gayley's appointment still further confirms the belief that they will not be given to an agency but put into one fleet and managed under Mr. Gayley's supervision. It is natural to expect also that in the selection of a manager for the ships, if he has full say in the matter, Mr. Gayley will turn to the present Carnegie organization on the lakes. The present managers of the different fleets say that if required their entire business affairs could be fully turned over to a new single head within a couple of days.

Other new officers announced after the first meeting of directors of the steel corporation are W. R. Walker, consulting metallurgical engineer of the American Steel & Wire Co., to be second vice-president, and as such superintendent of works operations, and W. P. Palmer, president of the American Steel & Wire Co., to be third vice-president in charge of sales. Mr. Walker's experience has been largely in blast furnace and steel works operations. Third Vice-President Wm. P. Palmer is one of the best known men in the steel trade of the country. He was assistant to the president of the Carnegie Steel Co. in President Lovejoy's administration. Later he became vice-president of the Illinois Steel Co. and then in turn general manager and president of the American Steel & Wire Co. All the selections thus far made for the management of affairs of the big corporation are of the very highest order. The policy of the corporation as announced is to leave each constituent company with its own set of officers, but all subject to supervision from the corporation's officers in New York.

## LAKE INSURANCE MATTERS.

Vessel men are hoping, in view of the activity prevailing among representatives of the insurance companies, that they will be offered, before navigation is fully opened, some reduction from last year's rates of insurance. As yet, however, the only basis for their hopes is the division of interests soliciting the business, which means more competition on this score if not among the companies that actually take the risks. Prominent among agency and brokerage interests that will be seeking the business this year are Smith, Davis & Co. of Buffalo, with C. W. Elphicke & Co. of Chicago and David Vance & Co. of Milwaukee; Johnson & Higgins of New York; W. A. Prime and J. G. Keith of Chicago, representing Chas. E. & W. F. Peck, and the new combination in the Sea & Lake Insurance Co., which will include Geo. L. McCurdy of Chicago, Edward Smith of Buffalo, Capt. D. Sullivan of Chicago, and others. Mr. McCurdy, who is a leading spirit in the new company, says that although its beginning is not with large capital, and its place may not be one of great importance this year, the principle of including ship owners among the stockholders involves conditions that seem certain to result in a broad development of the company. More may be said later on of the plans in this regard of promoters of the company. The new organization is incorporated under the laws of Virginia with a capital stock of \$500,000. The incorporators are A. B. Wolvin of Duluth, Frank J. Hecker of Detroit, James C. Wallace of Cleveland, George L. McCurdy and Dennis Sullivan of Chicago, Edward Smith of Buffalo, Charles A. Eddy of Bay City and William E. Fitzgerald of Milwaukee. The first meeting of stockholders was held in Cleveland on Tuesday and the following officers were elected: R. R. Rhodes, Cleveland, president; Col. F. J. Hecker, Detroit, first vice-president; Dennis Sullivan, Chicago, second vice-president; Col. George A. Garretson, Cleveland, treasurer; Scott J. Dow, Chicago, secretary; George L. McCurdy, Chicago, underwriter. Members of the executive committee are R. R. Rhodes, Col. F. J. Hecker, Dennis Sullivan, J. C. Gilchrist, Edward Smith, A. B. Wolvin, W. E. Fitzgerald, Charles A. Eddy and W. L. Brown. The home office of the company will be in Chicago.

## GREAT LAKES TOWING CO. IN FULL CONTROL.

It has been known for two or three weeks past that the Maythams of Buffalo, who undertook opposition last year on quite an extensive scale to the Great Lakes Towing Co. were negotiating a sale. After a year's struggle with quite a heavy loss (on both sides, of course) the Buffalo competitors of the tug consolidation found that in another year they would be called upon to meet a treasury fund of nearly \$100,000, which the consolidation had withheld from last year's business to meet competition; that the consolidation had all its property paid for, while they were very largely in debt for their tugs, and that the support of the big vessel interests was almost entirely with the consolidation, on account of Great Lakes' stock being held in large quantities by these interests. These conditions were, of course, discouraging to any opposition, no matter what its strength might be. It is not surprising that the Buffalo people were willing to give up at the best terms they could make. The sale was practically completed at a meeting in Cleveland Tuesday. The terms are not given out, but they are undoubtedly of a kind that will not prompt other opposition in the near future.

The absorption of the Maytham company removes practically the only opposition which the Great Lakes Towing Co. had in the towing business. When the Great Lakes Towing Co. was organized and the Maythams originally absorbed it was understood that they were not to engage again in the towing business for five years; and the towing company claims that the organization of a new company by them was a violation of the agreement. This was another source of disadvantage to the opposition as the matter was in court.

## REDUCED PRICES FOR IRON ORE.

A meeting of the producers of Bessemer ores was held in Cleveland on Tuesday and the price for all standard Bessemer ore was fixed. The base price agreed upon for 1901 is \$4.25 a ton. The base ore runs 63 per cent. iron, .045 phosphorus and 10 moisture. The relative price of all other ores will be based upon this. The question of the settlement of price was left entirely with the independent owners, the United States Steel Corporation taking no active part in it. This is most significant and shows that the corporation intends to conduct its affairs conservatively. It controls by far the greater part of the Bessemer product and could have ruled the price had it so desired. The base price is \$1.25 a ton lower than it was last year. Non-Bessemer ores have already been sold in quite large quantities at \$2.90 to \$3 for ores that sold at \$4 last year. The ore dealers say that the old range production will be about what it was last year, but of Mesabis there is, of course, considerable uncertainty at this early day. Considerable ore of all kinds will undoubtedly be sold within the next two weeks.

The new torpedo boat destroyer Goldsborough, recently finished at Portland, Ore., in her second trial over the prescribed course in the harbor at Seattle attained a speed of 31.84 knots, the requirement being but 30 knots. The builders are much pleased with this success and claim that the boat has broken the record for her type, which was formerly held by the Dahlgren. The engines and boilers worked to perfection. Cardiff coal was used.

Mr. George W. Brown of Portland, Me., is endeavoring to enlist capital in an enterprise to establish a dry dock and ship building plant in that town. He lately visited New London and was much impressed with the plant of the Eastern Ship Building Co.



## MARYLAND STEEL CO., SPARROW'S POINT.

DESCRIPTION OF AN EXCELLENT MARINE PLANT THAT HAS BEEN BUILT UP IN CONNECTION WITH A VERY LARGE STEEL INDUSTRY.

[Special correspondence to the Marine Review.]

Sparrow's Point, Md., April 10.—The ship yard of the Maryland Steel Co. at this place is rapidly becoming one of the largest and best equipped in the country. To successfully undertake the building of such large ships as the 500-footers for the Boston Steamship Co. and the Atlantic Transport Co., together with five other ships, extensive additions and improvements became necessary. Advantage was taken of the excellent location of the yard to provide in the first plans for growth along logical lines. The present improvements, suited to the original ideas, maintain the unity of the various departments and witness to the admirable foresight of the engineers in charge of the yard when laid out ten years ago.

The yard is located  $6\frac{1}{2}$  miles from Baltimore on the Patapsco river, near where it broadens out into the Chesapeake. Indeed, at this point the river is two miles wide. Abundance of room is here available for expansion on all sides. For a year past most of the waste products from the steel plant, suitable for making land where pile driving must be allowed for, have been used for filling in at the southern end of the yard. More than 6,000 square yards of land has thus been reclaimed. Here have been built slips E and F. Slips C and D have been rebuilt and lengthened to 500 ft. The two 500-footers, Nos. 35 and 36, for the Boston Steamship Co., are assuming form on slips D and E, while Nos. 37 and 38, of similar dimensions, for the Atlantic Transport Co., will be laid down on C and F slips. These slips are spaced 109 ft. centers, thus giving ample space for the hoisting towers adopted by this company for the handling of ship material. The first of these towers was built a little more than a year and a half ago, followed directly by two others from the same plans. These three have proved so satisfactory that for the larger work in hand three additional towers, greater in size, lifting power and speed, are being erected. They are being built by the Pennsylvania Steel Co. They run on sixteen gauge tracks at the ground level upon piling foundations. Each tower has a lifting capacity of  $7\frac{1}{2}$  tons at 54 ft. 6 in. from its center without counter-balancing, and will cover half a ship of the greatest beam on either side.

The tool shed, 140 ft. wide, has been lengthened 75 ft. to provide ample space for the mold loft. New direct electrical-drive punches, shears and bending press have recently been installed. The tracks for the stock yard crane, having a span of 54 ft. with a length equal to that of the tool shed, have also been extended 75 ft. A new 3-ton Niles electric travelling crane has been erected over the stock yard, thus providing two electric cranes for handling material at this point. Between the tool shed and stock yard a small 2-ton electric crane and tracks, having a span of 22 ft. 8 in. and 480 ft. long, for the laying out of plates and angles, have been built. On the other side of the tool shed and at the head of the building ships is a new gantry crane—span 38 ft.  $7\frac{1}{2}$  in. Under this crane the steel parts of the ships are assembled and riveted as far as practicable and delivered without further handling directly to the hoisting towers. Thus the ship material progresses steadily through the parallel lines of the stock yard, laying out floor, tool shed and erecting floor.

Radical changes in the power plant became necessary and two three-furnace marine boilers have been installed. Electric light and power is supplied by the main power plant at the furnaces of the steel department, but the enlarged use of compressed air tools has necessitated additional boiler power. An Ingersoll-Sargent compressor with a capacity of 1,200 cu. ft. per minute has been added to the air plant, and the mechanical department of the Maryland Steel Co. has just built and erected for this plant a vertical fore-and-aft compound two-stage compressor with a capacity of 3,000 cu. ft. of free air per minute. This latest compressor has steam cylinders, high pressure  $22\frac{1}{2}$  in. diameter, low pressure 43 in. diameter, and air cylinders 36 in. diameter first stage and 22 in. second stage, with a common stroke of 30 in. During the first stage the air pressure is carried to 40 lbs., and to 100 lbs. by the second stage. The air is distributed through the yard by new 10-in. mains, with 6-in. branches to the building slips. It is proposed to duplicate at an early date the compound air compressor and thus add another 3,000 cu. ft. to the capacity of the air plant.

The machine shop has shared in the general improvement and its output largely increased by the addition of much new machinery. The shop is operated night and day, and the force of machinists is being steadily increased.

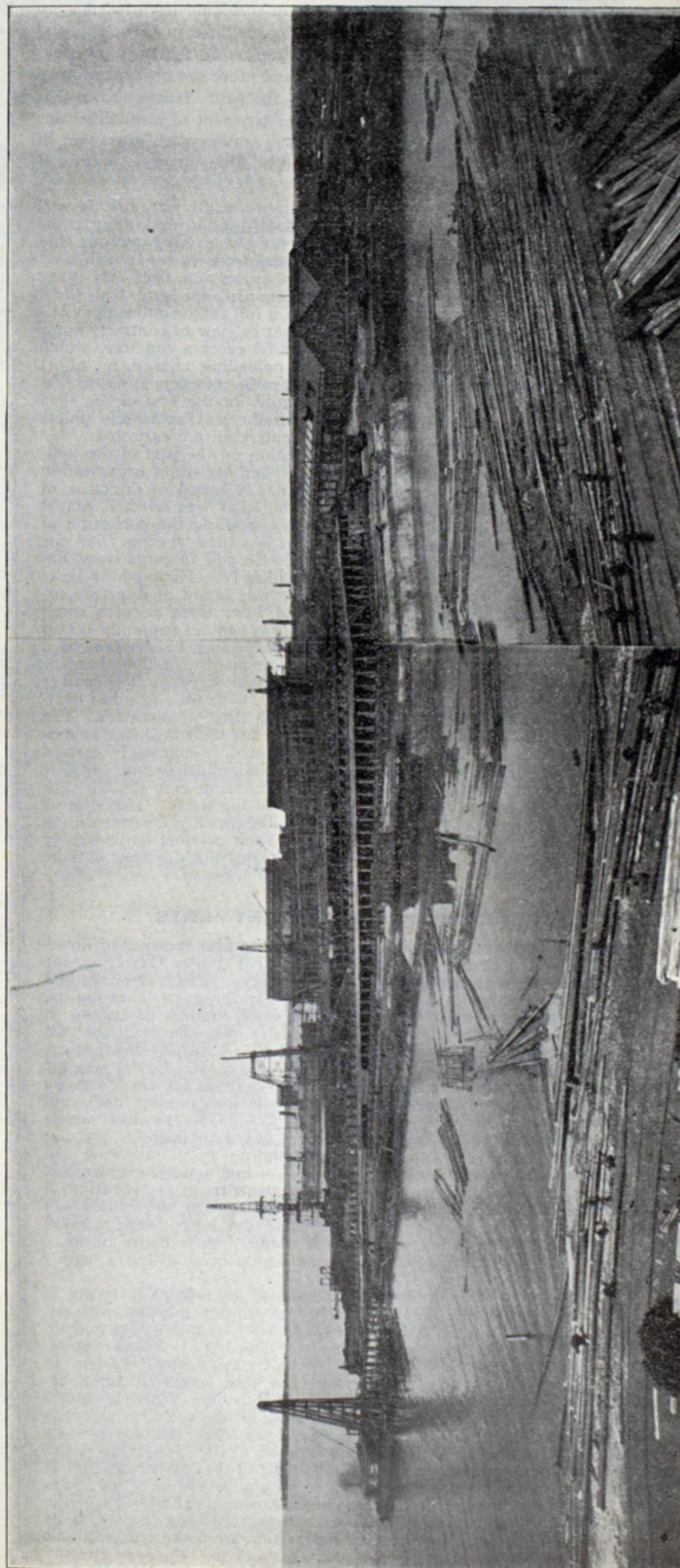
There are now employed on marine work by this company about 2,100 men, and this number will be increased by about 500 in the next few months. The dock department, which is building the great floating dock for the United States government, employs some 250 hands, and the furnaces, Bessemer plant and rail mill about 2,150, making a total of about 4,500 on the pay rolls.

The Maryland Steel Co. has recently completed and delivered to the New York, Philadelphia & Norfolk Railroad a steel car float 340 ft. over all, 46 ft. 4 in. molded beam; 48 ft. 3 in. over all beam; 12 ft. 6 in. depth. This float is fitted with four tracks and has a total capacity of twenty-eight loaded box freight cars. Steam and hand steering gear are provided. To supply steam for the steering engine and bilge pump a donkey boiler 66 in. diameter by 96 in. long, having 500 sq. ft. of heating surface

and 15 sq. ft. of grate surface, was installed. Crew accommodations are in a bridge house over the center of the float.

The newspapers have been noting the progress of the Pennsylvania Steel Co. on its plans for reorganization on a \$50,000,000 capital basis. It is well known that all the stock of the Maryland Steel Co. is held by the parent company, the Pennsylvania Steel Co., and intense interest is manifested here over the proceedings. Reorganization means undoubtedly a greatly increased investment at Sparrow's Point, and the ship yard will be benefited both directly and indirectly. The time limit for the surrender of the old stock of the Pennsylvania Co. has been extended to April 10. Over 90 per cent. has been turned in and the remainder is in sight. Every confidence is expressed in the success of the reorganization.

C. B. P.



MARYLAND STEEL CO., MARINE DEPARTMENT—A panoramic view showing the keel of No. 38, the water bottoms of Nos. 35 and 36 and beyond the hull of No. 34. Tool shed at the head of the ways to the right, machine and boiler shops in the background.



### CELTIC, LARGEST VESSEL EVER BUILT.

The White Star liner Celtic, which was launched at the yards of Harland & Wolff, Belfast, Ireland, last week is incontestably the largest vessel in the world. She is the perfect evolution of a new type of carrier of which the Great Eastern was the first example. The Great Eastern was a failure for many reasons. The Oceanic, greater than the Great Eastern, was a success, but the Celtic is greater even than the Oceanic. The Celtic is not as fast as the Oceanic, but she is, nevertheless, moderately swift. As she carries an immense cargo her passenger rates are quite low and she will doubtless become speedily a great profit maker.

The Celtic, as stated, is absolutely the largest vessel that ever was built. Her handsome elder sister, the Oceanic—the queen of the White Star fleet—is still the longest; but the new boat has more beam and her gross tonnage is 20,880 as compared with 17,274. Her displacement at a load draught of 36 ft. 6 in. will be 36,700 tons, as compared with the modern battleship's 14,000 tons and the Great Eastern's 32,160 tons. How she stands compared with other notable Atlantic steamers is shown in the following table:

Vessel.	Length over all, feet.	Breadth, feet.	Depth, feet.	Tons, gross.
Great Eastern.....	691	82.8	48.2	18,915
Campania .....	620	65	43	12,950
Kaiser Wilhelm der Grosse.....	626.7	66	39	14,349
Oceanic .....	705.6	68	49	17,274
Deutschland .....	660.9	67.3	40.3	16,502
Celtic .....	700	75	49	20,880

costly appliances had to be provided. The immense gantry at the Harland & Wolff works was put to its fullest use, and from it the hydraulic riveters and electric drilling machines were worked. Even as a mere traveling crane it was, with the exceptionally heavy lifts, absolutely necessary. The launching displacement of the vessel was 13,500 tons.

The engines, which are already practically completed in the machinery department of the Belfast concern, are of the Harland & Wolff quadruple expansion type; the cylinders are 33, 47½, 68½ and 98 in. in diameter by 5 ft. 3 in. stroke. Steam at a pressure of 210 lbs. will be supplied by eight double-ended boilers, each 15 ft. 6 in. by 19 ft. 6 in. Great speed is not aimed at. Everything in the way of auxiliary machinery that experience has taught the owners and the builders is necessary to a ship of the class has been provided, and much of it is exactly the same as that on the Oceanic.

As has been pointed out, the Celtic will not have the speed of the Oceanic. She will also differ from this ship in respect of accommodation, for she is built to fill the gap left by the tendency of the greyhounds to develop beyond the purse of the average traveler. She is the logical result of a close study of the economical facts of the situation, and with more than moderate speed, comfortable quarters at cheaper rates, and a certain mobility of her internal arrangement, she is likely to be successful. In her first-class accommodation there are single berthed rooms for gentlemen, and the open berths in the third class may be removed in favor of cargo should it offer. But, although the passenger rates will be lower, the standard of the accommodation will still be very high. About 347 saloon passengers will be accommodated, their staterooms being on the

### Maryland Steel Co., Marine Department.



View showing the three torpedo boats Truxton, Whipple and Worden, the steamer for the Boston Towboat Co., car float and dredge mills on the stocks.

The Celtic, it is almost unnecessary to say, is built on the cellular double-bottom principle. A flat bar keel is riveted on to the skin plating and through riveted on to the inner vertical keel, which is necessarily deeper below the engine spaces to insure rigidity. The greatest care has been taken that the hull shall be proof against all ordinary stresses, and time may safely be left to prove its stiffness. The bilge strakes have been doubled, and so have the sheer strake and the strake next but one below it, while the upper deck stringers have also been doubled in the matter of plates, except at the extreme ends. All the riveting here was done by hydraulic machinery, operated from the immense gantry used first in the building of the Oceanic, and in all the circumstances one is justified in doubting if the work could have been accomplished by other means. Whenever possible machine riveting was followed, and altogether 167,095 rivets of 1¼-in. size were so driven in the keel, double bottom, hull and stringers. Six longitudinals worked intercostally, three on each side of the vertical keel, increase the fore-and-aft strength of the structure, and with the thwartship vertical divisions make the cellular double bottom, which is bounded in the usual fashion with margin plates. The frame brackets are attached to the margin plates by double angles, and the floor plates have been similarly treated. Two intercostal keelsons add further to the longitudinal stiffness. Altogether there are nine decks, and at their levels there is a beam to every frame instead of one to every other frame. The decks are described as lower orlop, orlop, lower, middle, upper, bridge, upper bridge, boat, and sun decks. These details indicate pretty fairly the care that has been taken to produce a vessel of exceptional stiffness. One can hardly imagine any construction more generally perfect, and its success in the conditions it has to meet is assured. The labor of building a ship of so great proportions was necessarily heavy; its nature may be inferred from the fact that the shell plates numbered 1,392, were 1¼ in. thick, averaged 30 ft. by 5 ft., and in some cases weighed four tons. For a task of this magnitude ordinary tools were useless, and new and

upper, the bridge, the upper bridge, and the boat decks. The dining saloon, which is on the upper deck forward, is the full width of the ship, and with the library and the smoke-room makes an exceptionally handsome suite. Provision is made on the upper and bridge decks for 160 second-class passengers. The dining saloon for this class is aft on the upper deck; it is finished in white and gold, and, while not so wide as the other saloon on the same deck, is roomy and well lighted. A very large number of passengers will be accommodated in the third class, partly in cabins and partly in open berths. In addition to this complement of passengers, there will be a crew of 335; sixty-four on deck, ninety-two in the engine room and stoke holds, and 179 in the commissariat. The arrangements for feeding and generally caring for so many people are, it need scarcely be added, very complete.

No bids were received for the United States transport Terry, which a board of survey recently condemned and ordered to be sold. The upset price was fixed at \$40,000. The Terry was formerly the twin screw excursion steamer Hartford, built at Philadelphia at a cost of \$110,000. During the Spanish-American war the Terry was purchased by the government for \$150,000. She was used as a hospital ship, but lately has been carrying government material from one port to another in Cuba and Porto Rico.

The sixth annual convention of the National Association of Manufacturers will be held at Detroit June 4, 5 and 6. While this date is somewhat later than the customary one, it has been selected with a view to insuring favorable weather and in order that advantage might be taken of the numerous lake trips offered. The work of the association during the past year has been full of interest and importance to the manufacturers of the country and the business of the convention will have direct bearing upon their affairs.



## SHIP BUILDING IN THE UNITED STATES.

The last issue of the Review contained a brief summary of the report of the bureau of navigation, treasury department, regarding the construction of merchant vessels in the United States during nine months ended March 31. The treasury department year ends June 30, and hence the

## MERCHANT SHIPS BUILT IN THE UNITED STATES—FROM REPORT OF COMMISSIONER OF NAVIGATION.

Districts.	Nine months ended March 31, 1901.						Nine months ended March 31, 1900.					
	Steel Vessels.		Wood Vessels.		Total.		Steel Vessels.		Wood Vessels.		Gross Tons.	
	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.
Atlantic and Gulf.....	33	57,759	451	66,320	484	124,079	55	70,440	474	57,400	529	127,840
Pacific.....	4	6,030	79	25,492	83	31,522	1	1,063	74	18,591	75	19,654
Great Lakes.....	28	80,708	35	2,659	63	83,367	10	40,529	30	1,926	40	42,455
West'n Rivers	1	562	122	7,443	123	8,005	1	50	87	6,149	88	6,199
Totals.....	66	145,059	687	101,914	753	246,973	67	112,082	665	84,066	732	196,148

ending of the third quarter with the last day of March. The full report is now at hand. The main features of it are contained in a table on this page. Vessels officially numbered during the nine months (the government regard a vessel built when she is numbered) aggregated 246,973

## THE EXODUS TO EUROPE.

Notwithstanding the fact that there will be no special attraction on the other side of the ocean this year the agents of the various steamship lines say the outlook for a prosperous season is encouraging. Thus far the bookings have been up to the average for an ordinary year, but greater inquiry for accommodation is expected after the balmy weather sets in. It is announced in New York that steamship men would not be surprised should this year prove the banner one, except 1900, in the transatlantic passenger business. Last year, it is claimed, hundreds of persons remained at home in order to avoid the crush to attend the Paris exposition, and this year these will undertake the journey. The agents say that as the various industries of the United States are in a flourishing condition, many persons will be able to take a trip to Europe this year. There is every evidence of this fact, they say, in the extraordinary demand for second cabin accommodations.

On a few lines the summer season for eastbound travel will extend from the middle of April to July 15. On the other lines the summer season will open May 1 and end July 15. The minimum rate during the summer season on the Deutschland of the Hamburg-American line; the Kaiser Wilhelm der Grosse of the North German Lloyd; the Oceanic of the White Star line, and the La Lorraine of the Compagnie Generale Transatlantique, will be \$110, which is a small reduction from the rate last year. On other steamships the minimum rate ranges from \$50 to \$100.

A number of new steamships will be placed in the New York service of several lines this year. The American line will have the Philadelphia, formerly the Paris, which is practically a new vessel, remodelled and fitted with all the modern improvements for safety and comfort. She is expected to arrive in New York early in July. The Red Star line will have the Zeeland of 12,000 tons, and the Merion and Haverford, each of 10,000. The Zeeland is a sister ship of the Vaderland. The North Ger-

## RELATIVE NAVAL STRENGTH OF NATIONS.\*

## NUMBER AND DISPLACEMENT OF VESSELS OF DIFFERENT CLASSES, BUILT AND BUILDING, FOR THE SIX PRINCIPAL NAVAL POWERS.

TYPE.	UNITED STATES.				GREAT BRITAIN.				FRANCE.				GERMANY.				JAPAN.				RUSSIA.			
	Built.	Tons.	Build-ing.	Tons.	Built.	Tons.	Build-ing.	Tons.	Built.	Tons.	Build-ing.	Tons.	Built.	Tons.	Build-ing.	Tons.	Built.	Tons.	Build-ing.	Tons.	Built.	Tons.	Build-ing.	Tons.
Battleships, first-class (above 9,000 tons).....	9	99,830	6	78,000	45	562,470	11	154,900	19	197,920	1	12,530	9	95,782	5	60,000	4	54,400	2	30,400	15	162,915	7	92,300
Battleships, second-class, and coast-defense ironclads (below 9,000 tons).....	8	35,060	4	11,020	25	142,355	.....	.....	25	123,725	.....	.....	26	88,920	.....	.....	5	17,505	.....	.....	19	74,490	.....	.....
Armored cruisers.....	2	17,415	6	76,500	11	71,260	14	167,600	10	63,050	11	104,000	4	35,760	2	17,740	6	51,285	1	9,850	11	82,730	1	7,800
Cruisers, protected and unprotected, not armored (above 3,000 tons).....	18	86,300	9	43,200	77	446,490	.....	.....	22	105,495	2	7,860	9	49,210	.....	.....	10	41,485	.....	.....	8	46,680	8	44,860
Cruisers, 1,000 to 3,000 tons.....	23	32,915	.....	.....	72	134,615	8	11,600	17	30,250	.....	.....	20	38,660	3	8,400	16	27,995	.....	.....	19	28,875	.....	.....
Cruisers below 1,000 tons, gunboats.....	3	2,530	.....	.....	55	42,870	.....	.....	15	8,635	.....	.....	9	8,185	.....	.....	13	7,540	.....	.....	11	6,295	.....	.....
Destroyers.....	4	1,095	16	6,635	108	34,920	42	12,600	55	9,085	.....	.....	16	5,275	8	2,800	11	3,180	.....	.....	25	7,215	12	3,280
Torpedo boats.....	23	2,400	12	2,005	167	7,295	2	350	228	14,245	14	1,220	132	11,498	.....	.....	55	3,730	11	940	186	11,240	10	900
Training vessels.....	8	25,105	.....	.....	9	6,085	.....	.....	9	36,175	.....	.....	10	25,610	.....	.....	4	2,560	.....	.....	.....	.....	.....	.....
Total displacement.....	98	302,650	53	217,420	569	1,448,360	77	347,050	400	588,580	28	125,610	235	358,900	18	88,940	124	209,680	14	41,190	294	420,440	38	149,140
Total built and building..	151—520,070 tons.				646—1,795,410 tons.				428—714,190 tons.				253—447,840 tons.				138—250,870 tons.				332—569,580 tons.			

\*Prepared Office of Naval Intelligence, United States Navy, date of Oct. 17, 1900.

gross tons. The list includes 753 vessels of all kinds. This indicates for the fiscal year that will end with the 30th of June a probable total construction, including canal boats and other unrigged craft, of over 460,000 tons. The increase for the first three quarters of this year over the corresponding period last year has been 50,825 tons, of which 40,912 tons are credited to the great lakes. Steel steam vessels numbered fifty-six, of 128,369 tons, compared with fifty-nine of 102,322 tons for the corresponding period last year, the lake ship yards showing an increase of 33,500 tons, and the Atlantic seaboard a decrease of 13,000 tons. This decline on the Atlantic seaboard will, however, be made good by the end of the fiscal year when several large steamers, recently launched, are numbered, including the Pacific Mail steamer Korea, not yet measured.

The principal factors of the new tonnage are thirteen large lake steel steamers aggregating 59,860 tons, nineteen large wooden schooners of 35,470 tons, and five large steel ocean steamers of 29,683 tons for the Hawaiian trade, three of which are also under contract to carry mails to Australia. Eleven large rigged barges of 16,594 tons have been built. For the first time the lake ship yards have built considerable steel steam tonnage for the seaboard, seven steamers of 14,384 tons having thus far been built, which can pass through the Canadian canals. Four of these small steamers, when the ice permits, are designed for trade between lake ports and European ports.

The remaining vessels of over 1,000 tons are the New York & Cuba Mail Steamer Morro Castle of 6,004 tons; eight river, ferry and coasting steamers of 13,821 tons; one steel ship, Astral, 3,292 tons; two barkentines, 2,461 tons; and one steam dredge of 2,525 tons. The smaller vessels, under 1,000 tons, number 685 of 62,779 tons.

The new passenger and freight steamer Zulia was launched from the Neafie & Levy ship yard, Philadelphia, last Saturday. She has been built to the order of the Red D line and will trade between New York, Venezuela and Porto Rico. She is 277 ft. long and will have accommodations for both first and second-class passengers.

A chart of Agate and Burlington bays (Two Harbors) has just been issued and may be had from the Marine Review at 20 cents. As the district covered is small, the chart is on a large scale and shows clearly all the docks at Two Harbors. It is valuable also as a chart covering a part of the north shore of Lake Superior that is most visited by the ore and coal carriers.

man Lloyd will have the Kronprinz Wilhelm, of 15,000 tons, and the Neckar, of 10,000 tons. The Bremen, one of the vessels considerably damaged in the Hoboken conflagration last June, and which has been almost entirely rebuilt, will soon resume her place in the Bremen service. The Compagnie Generale Transatlantique (the French Line) will have La Savoie, of 10,000 tons, a sister ship of La Lorraine.

## BIDS FOR CONSTRUCTION OF THE MILWAUKEE.

Bids were opened in the office of the secretary of the navy last week to build the protected cruiser Milwaukee. Contract for this vessel had been awarded to the Bath Iron Works, Bath, Me., on condition that it restored certain items which had been eliminated in its bid. The Bath company felt that there would be no profit in the vessel and rejected the bid. At the present bidding there were only two bidders and three bids—the Union Iron Works of San Francisco and Cramp & Sons of Philadelphia, the latter firm submitting two separate propositions. The bids were as follows: Union Iron Works, to complete a cruiser in thirty-six months for \$2,825,000, according to the department's specific specifications; Cramp & Sons, proposal No. 1, to build a cruiser of 9,700 tons displacement and a speed of 23 knots in thirty-six months for \$2,740,000. This bid is peculiar in form. A memorandum states that it is impossible to build a ship of the speed and qualities required for less than \$3,000,000, but the Cramps will take the contract for a 23-knot, 9,700-ton cruiser for \$2,740,000, which is about the total available sum at the disposal of the department, on condition that the secretary will apply to congress for an appropriation of \$300,000 additional to bring the total up to \$3,000,000. A second bid submitted by the Cramps in the event that the first proposal is rejected is to build a smaller cruiser and a slower one, namely, 8,800 tons and 22 knots speed, in thirty-four months for the \$2,740,000 available. As the Union Works may be allowed 4 per cent. in the competition by reason of location on the Pacific coast, its bid is still within the funds available. The bids were referred to the board of construction for report.

United States inspectors of home and foreign steam vessels in San Francisco have rendered a decision in the matter of the wreck of the Rio de Janeiro, finding Capt. Ward to blame for allowing the steamer to leave her anchorage on the morning of the disaster, Pilot Jordan much to blame for attempting to bring the vessel into the harbor, and censuring Chief Engineer Herlipp for being absent from his post. The inspectors revoked the engineer's license.



## NEW SHIP YARD ENTERPRISES.

It has been rumored for some time past that Capt. James Davidson, vessel owner and builder of wooden ships at West Bay City, Mich., would undertake the building and repair of steel vessels at Erie. Capt. Davidson was in Cleveland during the past week. He would not make public any of his plans regarding the proposed new works, but is said to have stated to two or three Cleveland vessel men with whom he has close business relations that the project at Erie contemplates a large dry dock as well as a ship yard that will be suited in every way to the construction of steel freighters of all kinds.

Mr. C. A. Macdonald of Chicago, who has been at work for some time past on the formation of a company to take over the Miller dry dock plant on the north branch of the Chicago river, has been successful, and it is understood that the new organization begins with a capital in hand amounting to about \$600,000. M. A. Bradley and James Corrigan of Cleveland are among lake vessel owners interested with Messrs. C. A. Macdonald and J. J. Rardon in this enterprise. From names appearing in the board of directors it would seem that considerable of the capital comes from New York. The Chicago works will hereafter be operated under the name Ship Owners Dry Dock Co. Some adjoining property has been purchased and one of the dry docks will be enlarged to 500 ft. length while a complete equipment of tools, etc., for repairs to steel vessels is being installed. Mr. William W. Watterson, who is well and favorably known to lake ship owners, has been appointed superintendent of the yard and will take charge at once. Mr. Watterson has been for years directing ship building and repair work in Cleveland and has lately been in charge of the American Ship Building Co.'s docks in Buffalo, which position he leaves to take the new place in Chicago. Among directors of the new company are E. Mora Davison of August Belmont & Co., and G. L. Boissevain of Kean, Van Cortlandt & Co., New York; M. A. Bradley and James Corrigan of Cleveland, and C. A. Macdonald and J. J. Rardon of Chicago.

Equipments of Blake pumps ordered recently for the four new Pevey freighters, which are being built by the American Ship Building Co., will be practically duplicates of pumps furnished by the Blake company for the 500-ft. American Steel & Wire steamers Hill, Gates, Edenborn and Elwood. The cash value of the order for the four American Steel & Wire boats was the largest ever involved in a single order for pumps from the lakes, and this last order is very probably quite equal to it. The equipment includes cross-compound simplex air pumps and condensers, horizontal cross-compound simplex ballast pumps, two on each ship, horizontal compound outside packed plunger feed pumps, etc. These pumps are all gilt-edged in every respect. The stuffing boxes will be packed with Katzenstein's packing, steam cylinders lagged with Russia iron and brass bands, and the installation as a whole will include all that is novel and up-to-date marine practice.

The new steel steamer Kenebec, built by the Jenks Ship Building Co. of Port Huron for Chesbrough Bros., Bay City, was successfully launched last Saturday. The vessel is 255 ft. long, 43 ft. beam and 26 ft. deep, with a capacity of 3,000 tons, and is equipped with triple expansion engines.

Two barges for pulp wood trade, building at the works of Capt. James Davidson, West Bay City, for Frank Perry of Sault Ste. Marie, Mich., will cost about \$15,000 each. They are each 160x30x10 ft. and are to carry 800,000 ft. of lumber each on 9 ft. draught.

## MASTERS AND ENGINEERS OF LAKE VESSELS.

Tonawanda Barge Line, Capt. Wm. Dulac, Mgr., Mt. Clemens, Mich.: Steamers—Norwalk, Capt. Frank Goodrow, Engineer Joe Bedore; F. R. Buell, Capt. Syd Scott, Engineer John Deihl; Canisteo, Capt. C. W. Woodgrift, Engineer Chas. Sylvester; A. Weston, Capt. B. F. Ogden, Engineer Ed. Cottrell; C. A. Street, Capt. Wm. J. Lynn, Engineer Geo. Lynn. Schooners—J. B. Lozen, Capt. Arthur Elsey; J. Godfrey, Capt. John Lozen; A. Stewart, Capt. Noah Forton; Eleanor, Capt. Frank Duboy; Jenette, Capt. R. Moore; S. B. Pomeroy, Capt. Frank Desot; Elvina, Capt. Frank Laforge; Fulton, Capt. Eli Forton; Wm. B. Ogden, Capt. Eli Peltier.

Northern Steamship Co., W. C. Farrington, Gen. Mgr., Buffalo: Steamers—North West, Capt. G. A. Miner, Engineer —; North Land, Capt. W. C. Brown, Engineer —; Northern King, Capt. J. M. Saunders, Engineer —; Northern Queen, Capt. J. F. Vaughn, Engineer —; North Wind, Capt. J. J. Hartman, Engineer —; Northern Wave, Capt. M. S. Peterson, Engineer —; Northern Light, Capt. M. J. Haberer, Engineer —; North Star, Capt. F. G. Stewart, Engineer —.

Olga Trans. Co., E. G. Reisterer, Mgr., Tonawanda, N. Y.: Steamer—John C. Pringle, Capt. A. P. Gallino, Engineer J. N. Burns. Schooners—Sweetheart, Capt. C. F. Kellar; Unadilla, Capt. Thos. McDermott, Jr.; Benj. Harrison, Capt. Phil. Hepner.

Smith Transportation Co., Detroit: Steamers—A. L. Hopkins, Capt. Jas. McLarty, Engineer Wm. Naugh; Porter Chamberlin, Capt. Albert J. Schutte, Engineer Jas. Potter. Schooners—H. J. Webb, Capt. A. Mills; Uranus, Capt. J. M. Balfour.

Watson, Henry W., Buffalo: Steamer—Inter Ocean, Capt. Peter Wex, Engineer Thos. Ingram.

Capt. L. F. Hunt of Saginaw, who was a member of the firm of Prescott & Hunt, lake vessel owners, and who commanded the steamer Rhoda Emily, which runs between Cleveland and Duluth, dropped dead on a Michigan Central passenger train a few miles north of Oxford, Mich., Tuesday. Capt. Hunt was on his way to Cleveland to take charge of his vessel at the time. He had sailed the lakes for thirty years and was well known. He was sixty-three years of age.

The Pan-American exposition at Buffalo opens May 1, 1901, and don't forget that the Nickel Plate road is the shortest and most expedient route to Buffalo and will land you directly at the exposition gates. Rates are in effect April 30, 1901, and good going or returning on any of our trio of daily express trains. Write, wire, 'phone, or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O.

No. 37 June 1.

## NEW YORK STATE CANALS.

Since the politicians of New York state wasted \$9,000,000 on an attempt to improve the Erie and other canals, a few years ago, there has been little interest outside of the state in the important question of canal enlargement, which after all should be of as much interest throughout the entire lake region as it is to the people of New York. The New York legislature is again considering the subject but the outlook for actual improvement is no more promising than it has been for several years past. Two projects for enlarging and improving the canals, one based upon canal boats of 450 tons capacity and the other upon lake and canal barges of 1,000 tons, were reported upon to the governor. The 450-ton boat project was approved by the governor and a bill for carrying it into effect has been recommended by the canal committee and is now before the state senate. This measure provides for the issue of \$26,000,000 in seventeen-year 3½ per cent. bonds. The Erie and Oswego canals are to be widened and deepened so that the depth of water on the lock sills will be 9 ft. and the present maximum load of 250 tons be increased to 450 tons. The Champlain canal is to be deepened to 7 ft. The locks are to be widened and deepened and additional side locks provided in some places, so as to shorten the passage time between the lakes and tidewater by diminishing the chances of delays at the locks. The bill meets with two classes of opponents. Those of one class are against spending any more money on the canals, regarding it as useless to compete with the railways which have already taken away the greater part of the former business of the canals. They claim the proposed expenditure of \$26,000,000, in addition to the \$9,000,000 expended a few years ago, will be sending good money after bad. The other class agree that the expenditure will be wasteful in that the improvement would not go far enough, but they give another reason for objection to it. They favor the adoption of the other plan reported, which provides for a canal capable of accommodating barges of 1,000 tons that can be loaded at lake ports and proceed without transshipment of cargo direct to tidewater. If the \$26,000,000 project is put to sleep they think there will be a chance next year of passing the 1,000-ton barge canal bill, which would involve a much greater expenditure, but which it is claimed would result in improvement amounting to something. If the present bill should get through the legislature, about which there is much uncertainty notwithstanding the victory won for it in the first skirmish, nothing can be done unless the issue of the bonds is approved by the people at the general election in the coming fall. The fight in the legislature will be removed to the polls and the chances of the scheme are questionable, to say the least.

## TEN YEARS IN COURT.

The United States circuit court of appeals, sixth circuit, has just entered a decree in a collision case of the great lakes that has certainly gone the rounds of the federal courts. The case is that of the Erie & Western Transit Co. against the propeller New York, owned by the Union Steamboat Co., and grew out of a collision in the Detroit river between the propellers Conemaugh and New York, Oct. 21, 1891. The Conemaugh was sunk and sustained considerable damage, but the damage to the cargo, about \$40,000, was even greater than the hull damage. In the first hearing before United States District Judge Swan at Detroit both vessels were held at fault and the damage divided. On rehearing in the same court the New York was held solely at fault. On appeal to the United States circuit court of appeals, sixth circuit, the decree below was reversed and the Conemaugh held solely at fault. Then the case was taken to the United States supreme court on a writ of certiorari and the decree of the court of appeals reversed, both vessels being again held at fault, but with full decree against the New York for all the Conemaugh's cargo damage. After issuance of mandate decree was entered in the district court against the New York for all the cargo damage, and the damage to the Conemaugh and to the New York was divided to these two vessels. Proceedings in mandamus were then brought in the supreme court to modify the decree so as to divide the cargo damage to both vessels. The petition was dismissed. The cause was appealed again to the circuit court of appeals on the same question and on Tuesday last that court delivered an opinion affirming the decree of the district court, which divided the damage to the two vessels but requires the New York to pay all the cargo damage. The case may not be at an end even yet. Interest is certainly piling up on the damages involved, as the rate is 7 per cent. Harvey D. Goulder of Cleveland for the Conemaugh and C. E. Kermer of Chicago for the New York are leading counsel in the case.

## DULUTH GRAIN SITUATION.

Mr. G. A. Tomlinson, vessel agent at Duluth, reports the following quantities of grain in store in Duluth and Superior elevators on the 8th inst., compared with stocks on the same date a year ago:

	1901.	1900.
Wheat .....	9,612,958	17,697,913
Barley .....	76,738	203,551
Flax .....	338,189	326,264
Oats .....	1,258,894	368,219
Rye .....	390,509	431,719
Corn .....	5,182,738	1,427,464
Total .....	16,860,026	20,455,130

There is some inquiry for tonnage, Mr. Tomlinson says, but no ships are offering, owing to the engineers' strike. The weather is extremely mild. Portions of the lower harbor are clear of ice, but the area in the lake has not diminished. Hard coal is practically exhausted. Of bituminous coal there is about 250,000 tons still on the docks.

An effort is being made to consolidate the dredging concerns of the lakes, but promoters of the scheme say it has not developed far enough as yet to admit of the publication of anything that would be of general interest. An attempt on the part of dredgers three or four years ago to pool their interests was unsuccessful.

Transfers of vessel property: Tug Richard Endress, Capt. Clow of Menominee to Louis Ganley of Sault Ste. Marie, Ont.; schooner Reuben Doud, T. Hurley of Detroit to Capt. Alex. Ure of Charlotte, N. Y.



## NORTH STAR-SIEMENS COLLISION CASE.

JUDGE HAZEL OF THE UNITED STATES DISTRICT COURT, BUFFALO, HOLDS THE NORTH STAR ALONE AT FAULT—A CASE INTERESTING ON ACCOUNT OF THE SAULT RIVER BLOCKADE THAT FOLLOWED THE COLLISION.

In November, 1899, the Rockefeller steamer Sir Wm. Siemens was sunk in Little Rapids cut, just below the Sault canal, by the steamer North Star of the Northern Steamship Co.'s fleet, and for several days thereafter navigation to and from Lake Superior was completely blocked, as the position of the Siemens in the narrow channel at that point in the river was such that other vessels could not pass. The law suit resulting from the collision was not tried until a few months ago in Buffalo. The owners of the Siemens libeled the North Star and a cross-libel against the Siemens and her tow barge Alexander Holley was filed by the owners of the North Star. United States District Judge Hazel has entered a decree. He finds the North Star alone at fault, dismisses the cross-libel and refers the cause to a commissioner to ascertain and report the damages. About \$30,000 is involved, including demurrage. Goulder, Holding & Masten with Clinton & Clark of Buffalo represented the Siemens. The North Star was represented by Shaw & Cady of Detroit and Joseph C. Dudley of Buffalo.

In the first paragraph of the written decision, which is at hand, the court says that the law regulating navigation on the great lakes is the White law, but that the law to be invoked in this case is very plainly the special rules and regulations governing the navigation of the St. Mary's river. Such special rules for a particular locality, upon the principles of statutory construction, must take precedence over general rules, where the special rules apply, while at all other places and even in the special places where the special rules do not cover the situation, the general rules of navigation must dictate the movements of vessels. The decision, practically in full, and including the court's statement of the case is as follows:

Early in the morning of Nov. 28, 1899, five vessels were moored abreast at the government pier, generally known as Old Fort Brady pier, ready to proceed down the river through Little Rapids cut, so-called, a narrow and difficult channel, 300 ft. wide, where there is a current of two to three miles an hour. The distance between the light-house crib at the northern entrance to Little Rapids cut and the government pier at Sault Ste. Marie is about one and one-half miles. Little Rapids cut is about four miles long from its northern entrance. The five vessels referred to were moored at the government pier in the following order: North Star, tied to the pier; the Pennsylvania with barge in tow, abreast; Sir William Siemens and her consort, Alexander Holley, made fast abreast the Pennsylvania's tow. The North Star is 300 ft. over all, keel 299 ft., beam 40, gross tonnage 2,400, full speed 12 miles per hour, and at the time of the collision was drawing 16.8 ft. of water, laden with package freight and bound from Duluth to Buffalo. The total length of the Sir William Siemens was 432 ft. over all, her keel 413 ft., 48 ft. beam, and at the time of collision she was drawing about 18 ft. of water. The Alexander Holley is 361 ft. over all. The Siemens carried 5,222 and her tow 5,000 tons of iron ore. At about six o'clock in the morning, bright and clear, just about sunrise, the steamers Angeline and Hackett came through the ship canal, and passed down the river without stopping. They passed the moored vessels, the Angeline going ahead; the Hackett signaling to the Siemens, which at the time was getting under way and was even then ahead of her tow. The masters of the Angeline and Hackett, when in Little Rapids cut, heard signals afterwards given by the North Star to the Siemens, and being attracted thereby observed the North Star and Siemens abreast, making the turn into Little Rapids cut at the northern entrance by the crib light. The Siemens was the first of the moored vessels to get under way and had previously proceeded out into the river and made up her tow, using about 600 ft. of steel cable. The cable was wound on a drum by an automatic towing machine which paid out the cable speedily and without interference in getting under way. She, therefore, quickly chose her course and was soon moving at a rate between 6 and 7 miles an hour through the water, or 8 or 9 miles over the ground. The Siemens headed to the south of the Bayfield ranges, distant about 1½ miles, in a northerly direction from the government pier. When passing the red can buoy at the Bayfield rock her captain, who was on the bridge over the pilot house, heard the North Star blow two blasts of the whistle, indicating her intention to pass the Siemens on the left or port hand, as provided by treasury rule 5. This was in that part of St. Mary's river between the government pier and the crib light-house at the northern entrance of Little Rapids cut. The North Star at this time having cleared the government pier was abreast the Siemens tow. The captain of the Siemens immediately responded to the signal given when the North Star was abreast the tow by five or six rapid blasts of the steam whistle, as testified to by him and by others on the Siemens and the barge Holley, intending to give notice as required by rule 5, that he did not think it safe for the steamer astern to attempt to pass at that point. The witnesses for the North Star who heard the Siemens reply say that it consisted of four distinct blasts of the whistle. These whistles were interpreted by the captain of the North Star as assenting signals and indicative of the Siemens desire to have the Star "come on and hurry up." Considerable expert evidence was given on the trial in behalf of the North Star to establish that four blasts of the whistle are generally understood by navigators of the lakes as an invitation to "come on and hurry up," and that at the time of the collision it was the practice to so interpret that signal.

MAURICE B. GROVER CASE NOT OF THE SAME KIND.

Proctors for the North Star strenuously urge on the consideration of the court the case of Maurice B. Grover. That case was decided in 1897, before the treasury rules relating to the St. Mary's river were promulgated. From an examination of the facts in that case, it appears that the steamer Moran went aground in the St. Mary's river near the light crib at Sailor's Encampment island. The Grover gave the usual bend whistle to warn approaching vessels that she was coming down the river. The Moran gave no signal to the Grover, but just previous to the collision she blew a signal of four blasts for a tug to come to her assistance. The tug answered the signal, but those in charge of the Grover swore that they

did not hear the answer. The court said: "A signal of four blasts may mean a call for a tug or it may mean 'hurry up,' depending upon the length of the blasts." The record of the Grover case shows that the blasts of the whistle were ordinary blasts and that the Moran was aground. While in this case the Siemens was speeding towards the turn, increasing her speed as she went. There is no difficulty in differentiating and classifying sound emanating from a steam whistle on a lake steamer. There is no substantial claim that the blasts of the Siemens whistle were other than such as caused an impression on the witnesses who heard them that there was apparent trouble or danger. The claim of the respondents that a four-blast whistle is commonly understood and interpreted by navigators of the lakes as a "hurry up" signal can have no substantial bearing upon this controversy. Treasury rule 5 is mandatory. Whatever custom or usage was in vogue prior to the enactment of the rule must yield to the provisions of the statute.

Witnesses for the Siemens testify that the whistles of the Siemens were five or six short and rapid blasts. Other witnesses for the Siemens testify that the blasts of the whistle were four or more short and rapid blasts. Capt. Saunders of the steamer Hackett, when the first reply of the Siemens was sounded, says that as he proceeded on his course he heard several short and rapid blasts conveying to him a signal of danger and alarm. He looked astern and saw the Siemens and her consort a short distance above the Bayfield rock coming down the river, the North Star then being a little astern of the Holley. After a short interval two blasts were again sounded by the Star and the Siemens again replied with several short and rapid blasts. The North Star was then abreast of the Holley at Bayfield rock. Durand, master of the Holley, says that the Siemens twice blew six short blasts. Capt. Gunderson, master of the Siemens, says that his reply to the signals of the Star was several short and rapid blasts of the whistle, six or more in number; he was then going under half speed and gave an order to the engineer to go slow preparatory to making the turn at the bend. Tear, the mate of the Siemens, heard several short and rapid blasts of the whistle, but cannot tell the number. Rae, master of the Pennsylvania, says that there were as many as four blasts of the whistle and he would take them for danger signals. Other witnesses for the Siemens gave testimony that four or more short and rapid blasts of the whistle are not understood by navigators of the lakes as a reply to "hurry up and come on," but are invariably understood to mean alarm and danger.

### SIEMENS BLEW DANGER SIGNALS, NOT A HURRY-UP CALL.

The preponderance of the evidence shows that the answers of the Siemens to the signals of the astern vessel were danger signals and were sounded in compliance with treasury rule 5. The word "several" is commonly understood to imply more than two, but not very many. It must, therefore, be accepted as undisputed in the case that several blasts of the whistle were blown in answer to the passing signals of the North Star. I am satisfied from the proofs that the blasts of the whistle were short and rapid blasts, not less than four in number. It is clear that there was no justification or defensible propriety in misunderstanding the signals that were sounded by the Siemens, in view of the situation of the vessels and the manner of sounding the whistle by the Siemens. The North Star was the overtaking vessel going in the same direction as the Siemens and tow. The obligations of precaution and care imposed on her as an overtaking vessel were most flagrantly violated and set at defiance. There may be said to have been a deliberate intent to pass the Siemens and tow, irrespective of laws or rules governing the movements of vessels in St. Mary's river, and for the express purpose of being the first to reach the channel, where passing is prohibited. Navigators of vessels on the lakes must be presumed to have knowledge of the rules and laws governing St. Mary's river. The captain of the Star had actual knowledge of these rules, and yet, without observing or giving heed to an important restriction, he attempted to pass the vessel ahead without receiving an assent. The Siemens and tow at the time that the North Star cleared the government pier were a quarter of a mile distant, heading for a narrow channel 1½ miles from the pier. Moreover, the North Star had the Siemens in full view during her entire attempt to injudiciously pass the Siemens before reaching the turning point at the light-house crib. The speed of the Siemens was increased to almost the statutory limit immediately after the reply was sounded by the Siemens to the Star's declared intention to pass on the port side.

In view of the law and the facts applicable thereto, I do not hesitate to find that the North Star in her attempt to overtake and pass the Siemens without first receiving the signal prescribed by treasury rule 5 was at fault. The question of contributory fault by the Siemens at the point where the turn by both vessels was made is not free from difficulty. The North Star's negligence in coming abreast of the Siemens and in attempting to pass her without receiving the assenting signal required by law did not justify the collision if it could be avoided by the exercise of proper care. The claim of the North Star is that the Siemens' master intended to prevent and endeavored to prevent the Star passing, not only by wrongfully accelerating the Siemens' speed, but also by crowding the Star and by wrongfully directing his course to port just as the Star was about passing clear, thereby precipitating the collision. Capt. Stewart of the North Star testified that after receiving the last four blast signal he was not overtaking the Siemens as fast as he had the Holley; that the tow was increasing its speed. Nevertheless, the Star at a time when prudent seamanship prompted reversing or checking, increased her speed with the apparent object of overtaking the Siemens before reaching the prohibited channel.

### SIEMENS WOULD NOT HAVE ACTED PRUDENTLY IF SHE HAD REVERSED.

I think the preponderance of the evidence shows that it would not have been prudent seamanship for the Siemens to reverse at this time. The Siemens and Holley were laden with iron ore. The length of the tow from the bow of the Siemens to the stern of the Holley was approximately 1,500 ft. The distance from Bayfield rock to the turn into Little Rapids cut is 2,700 ft. The Siemens, therefore, was 1,200 ft. from the turning point and within 200 ft. of the place where maneuvering is ordinarily commenced to make the necessary turn into the channel, at the time signals were first sounded. Both vessels were then going, approximately, the statutory limit of 9 miles over the ground. Obviously, the master of the Star must have been aware of the imprudence of the attempt to overtake the Siemens. There was no obligation on the part of the Siemens



to give way. The Siemens at this time had performed the duty imposed on her by statute. Her master had signified that it was not safe for the Star to pass. It is claimed by the Star that the testimony of witness Geary, who, up to the time of collision, was wheelsman on the Siemens, establishes that the Siemens crowded the Star out of her course and that she was at fault in directing her course to starboard. The claim is that starboarding brought the Siemens over toward the side the Star had signalled she desired to take and in that way her course was impeded. This is denied by the master of the Siemens and other witnesses on board the Siemens and Holley. The Siemens had proceeded in her usual and ordinary course. The Star obstinately pursued her course and was soon abreast of the Siemens, causing her to sheer to starboard. Both vessels made the turn into Little Rapids cut at the black stake nearly abreast. The Siemens made the turn at the light crib leading into the cut close to the can buoy—considerably closer to the buoy than was ordinarily deemed necessary. The turn was to starboard about four points. The Siemens ported her helm. Her helm failing to respond readily, she hard-ported and with the aid of a "kick ahead" made the turn at the bend and proceeded down the cut. A "kick ahead" increases the velocity of the screw and brings the current from the propeller wheel against the rudder in making the turn. At this time the Star's bow was amidships of the Siemens and 30 ft. distant. The Siemens checked to half speed. The Star drew swiftly along side. The Siemens immediately steadied after the turn was made on the west bank of the cut. The Star kept forging ahead and when her boiler house was abreast the Siemens' pilot house the impact took place. The Star swung across the channel, striking the west bank of the river. The stern anchor of the Siemens was let go and the current caught her stern, shifting her ahead past the Star, 200 ft. from the point of collision. The Siemens bow was imbedded in the clay bank with her stern swinging across the channel. The North Star was on the east bank.

The evidence is conflicting as to whether the collision was due to a sheer of the Siemens to starboard at the time the Star was alongside and swiftly passing, or whether it was due to the failure of the Siemens to efficiently manage her port helm. Wheelsman Geary says the Siemens' starboarding when she was near Bayfield rock brought her over to the northward of the course and over toward the side the Star had signaled she would take; that the Siemens took a broad turn at the crib, in order to unduly crowd the Star out of her course and to prevent her from passing, and that if she had hard-ported her wheel at all it was after the collision. The conduct of this witness after the collision and his statements to impeaching witnesses are not such as to inspire confidence in his testimony. The evidence of the Siemens' wheelsman (Ferris) shows that he was near the wheel and ready to relieve Geary. While he had charge of the wheel he received an order to "port more" and to "hard-apt," but on cross-examination he says that the Siemens was not hard-ported until after the impact. Respondent's witness (Sweet) says that the Siemens' bow was from 400 to 450 ft. from the crib when she struck the Star and that she was further from the crib than he ever saw a boat go before. But I believe the weight of the evidence establishes that the turn was made by the Siemens close to the black stake.

#### CAPTAIN OF THE STAR MISJUDGED SPEED OF SIEMENS.

Celerity was the chief object of the Star. Her speed steadily increased from the time she signalled the ahead vessel at the Bayfield rock, so that within a half mile her bow passed the ahead vessel going at the rate of 9 miles an hour. I conclude that the Star anticipated her greater capabilities for speed would permit her safely to overtake the vessel ahead. When she arrived at the bend there was abundant navigable space, so that she could have reversed or checked with absolute safety. Instead of pursuing this prudent course at the time the Siemens ported her wheel and steadied for the narrow channel, she followed the Siemens around the bend. Her captain says: "The Siemens steadied her wheel and I steadied the Star, and he ran probably a length and then started to port again and I did the same thing, and I ran down that way about on a line with the east edge of the cut, just barely enough to clear the red can buoy." Respondent's evidence does not make it clear that the seamanship of the Siemens when making the turn or when lower down in the channel was such as to impute to her such fault or careless navigation as would hold her in any degree responsible for the collision. Assuming that when the collision became imminent the Siemens did not hard-apt her helm, it yet appears that the collision was then unavoidable. If the Siemens did commit any error of seamanship while in this situation I regard it as one committed in extremis and therefore excusable.

There is a conflict of evidence as to the locality of the impact between the Siemens and the Star. Whether it occurred at the bend or in the prohibited channel about 1,200 ft. below, is not material. It satisfactorily appears from the evidence that the barge Holley was abreast the light-house 70 ft. from the black stake, where the turn was made. When we give consideration to the length of the tow and to the evidence of Capt. Gunderson and Stewart, it is clear that the vessels came together about 800 ft. from the bend. There was crowding and backing resulting in the Star settling on the easterly bank of the cut, about 400 ft. from the point of collision. The Siemens brought up on the westerly bank of the prohibited channel with her stern toward the east. The Holley having broken her anchor chain in her endeavor to stop after the first impact, came up striking the starboard quarter of the Siemens, forcing her against the Star. Respondents claim that the Siemens and Holley were each at fault in not keeping a proper and sufficient lookout; that the Siemens was particularly at fault in its failure to immediately respond to the Star's signal when she arrived at the government pier. Proofs offered on the trial render it only necessary to consider the alleged fault of the Siemens. She cannot be held for contributory fault because of the failure of her captain to hear the first passing signal sounded by the Star immediately after she left the government pier, although treasury rule 5 for St. Mary's river and pilot rule 6 require the steamer ahead to immediately answer a passing signal. No presumption of acquiescence or of concurrence can arise under the rules of navigation applicable to St. Mary's river from failure by a vessel ahead to sound an assenting or dissenting signal. Passing a vessel going in the same direction is prohibited unless a mutuality of purpose be established. Communication between the overtaking vessel and the vessel ahead by signals of the character and number prescribed by law is absolutely essential. Manifestly the interchange of signals by blasts of the whistle must plainly indicate the manner in which the vessel astern

intends to pass and likewise when such passing may safely be done. Silence on the part of the Siemens when the initial North Star signal was sounded should have insured circumspection and deliberate wariness by the North Star. The captain of the Siemens testified that he did not hear the Star's first signal; that the first whistles that he heard were when the Siemens was abreast the Bayfield rock. It may well be that he was so occupied at the time that the first signals were not heard. The failure to hear the North Star's whistle was not a contributory cause of the collision. It in no sense misled the North Star, for when her signals were repeated they were answered and such answer gave abundant time for the North Star to keep away by reversing or checking her speed.

The Siemens' lookout was not at his post when the Star's first signal was sounded. Neither was this a contributory fault. This violation of rule 28 of the White law, in view of the North Star's endeavor to pass without receiving an assent, had nothing to do with the disaster.

#### FRENCH VIEW OF THE ENGLISH BOILER REPORT.

Marc Landry in *La Figaro* of March 17 discusses the recent report of the British admiralty committee upon the Belleville boiler. He advises all French engineers to read the report carefully. It should be stated that the report is not favorable to the Belleville boiler. The gist of his discussion is as follows:

"The English commission, called the water-tube boiler commission, was presided over by Vice Admiral Sir Compton Donville, assisted by some ten machinists and engineers of the royal navy or engineers of great commercial navigation companies. Their competence was well known although we find in the report published by them certain assertions that show that the special question of the water tube boilers must have escaped the studies of some of the commissioners. It is, in fact, surprising that the English commission has discovered in the month of March, 1901, that the water tube boilers are superior from a strategical point of view to the cylindrical boilers, seeing that for ten years and more all the navies have proclaimed this superiority. It is also surprising that the commission declares in the seventh paragraph of its report that the cylindrical boilers have, as far as fuel economy is concerned, some advantages over the water tube boilers, when the general experience is otherwise. Our own ironclad *Gaulois*, for example, consumes  $1\frac{1}{2}$  lbs. of coal per horse power per hour—a figure which no cylindrical boiler has ever attained. There is good reason for English sympathy for the cylindrical boiler—it is that no English construction company has to date been able to produce a good water tube boiler for great ships. They were bound to act as good countrymen in not absolutely cancelling the old boiler dear to English builders.

"The French fleet is considerably equipped with Belleville boilers and they have always given the best results. Apart from our ironclads and our squadron vessels there are a number of cruisers on long voyages which have acquitted themselves admirably. The *Alger*, the *Descartes*, the *Pascal*, the *Bruix*, the *Amiral-Charrier*, the *Bugeaud* have recently served in China or in Crete; the *Protet* and *Regaud* de Genouilly have cruised for a long time in the Pacific and have proved the endurance and good working qualities of their boilers. The official reports of their captains are unanimous upon the subject. And it is not only in the navy that this boiler is appreciated. Such packet boats as the *Australian*, the *Polynesian* and *Armand-Behic* of the *Mesageries Maritimes* Co. have been navigating with the Belleville boiler since 1890 and have run over 200,000 knots to the entire satisfaction of their captains and engineers. Such other rapid packet boats in the service from Dieppe to Newhaven as the *Samise* and *Manche* are also provided with the Belleville boilers and their service is excellent. How is it that the conclusions of the English commission are in conflict with the experience of the French navy? The reason is simple. The English navy has always neglected to initiate its mechanical staff in the running of the Belleville boiler and it is want of instruction which has caused some failures. The commission admits this in the eleventh paragraph of its report. The moral of this English report is that it is less the apparatus which is to be improved than it is the staff which is called to operate it. Time shall tell whether the admiralty will consent to acknowledge that its engineers are not able to use a boiler that is so well used elsewhere."

#### SILVER SERVICE FOR THE ILLINOIS.

The battleship *Illinois* is to have one of the most beautiful silver services in the navy. The pieces comprise a large punch bowl, ladle and stand, a smaller bowl of the same pattern, three massive dishes and two candelabra. The mammoth punch bowl, the largest piece in the set, is 2 ft. in diameter and 17 in. high. On one side is the name "Illinois" in oxidized silver, and beneath it appears the seal of the state. On the other side is the inscription: "Presented to the United States battleship *Illinois* by the citizens of the state in honor of which the ship was named." The inside of this great bowl, which will hold ten gallons, is lined with gold. The smaller punch bowl shows exactly the same treatment, and the lettering and seal appear on every piece in the set. Specially worthy of mention are the two great candelabra. Each has eight trunk branches, and these are twined in a graceful sweep, making a circular network of heavy silver tubing surmounting the ornamental base. It has been decided to make the presentation of this magnificent collection to the warship some time during the last days of the present month at Newport News, where the *Illinois* will be put into commission. Invitations will be sent to all citizens of the state who have contributed sums towards the purchase of the gift. President McKinley and members of his cabinet and representatives of the army and navy will also be invited to attend the ceremonies. Governor Yates and his staff will attend. The committee on design, which was intrusted with the selection of the gift, consists of the following: H. N. Higinbotham, John R. Tanner, Franklin MacVeagh, C. L. Hutchinson, Frank O. Lowden, E. G. Keith, W. Penn Nixon, John R. Walsh and John W. Bunn.

It has been arranged that Frank K. Hackett, the assistant secretary of the navy, will retire from office when Secretary Long returns to Washington from his summer vacation. This is in accordance with the express wish of Mr. Hackett.



# MARINE REVIEW

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The old story is again afloat that negotiations are pending for a consolidation of the interests of Vickers Sons & Maxim of England and the Cramps of Philadelphia. Mr. Grant Browne of London is said to be in this country for the purpose of getting the Philadelphia firm to manufacture the ordnance of the English firm. However, we shall see what we shall see.

Two great passenger steamers costing \$650,000 each are building at Detroit. Francis J. Clergue, who has planned to spend \$25,000,000 in various enterprises at the Sault and on the north shore of Lake Superior, and who has already spent a very large part of that sum, says he will soon open up the beauties of the north shore to tourists from all parts of the world. All of the existing passenger lines are badly in need of new ships. The passenger business of the lakes is entering upon a period of great development. It will be a natural and substantial growth. There's nothing in this wide world so fascinating as the romance of the great lakes. Some day it will be fixed in pigment and prose. The great American novel never will be written until it is written against the background of these lakes. There's nothing so distinctly American as these unsalted seas. Niagara is only an infinitesimal part of them; and yet an innumerable caravan of poets and painters have each taken their separate fall out of Niagara. There's nothing which so fitly illustrates the industrial greatness of the United States as the commerce of these lakes. It is the country's great workshop. People are just beginning to grasp the advantages which the lakes have to offer for summer cruising. Those who have put hundreds of thousands of dollars into passenger boats might think that they have fairly realized them already. But they have not. They are only just beginning. When one man grasps a great principle it is seized upon by thousands of minds in all parts of the country almost simultaneously. This alacrity of comprehension is so instantaneous as to lead one to believe in the existence of a universal mind, that things are never discovered but merely interpreted and that it is quite possible that two may interpret at the same time. Such reasoning may account for the fact that Gray and Bell reached the patent office the same day with the same invention. As soon as a great central fact is revealed to one man it is communicated to thousands. They seem to resolve its essential qualities from the very air itself. That's it, it's in the air. The picturesque quality of these lakes is just beginning to be understood. They were picturesque when the waters lapped nothing bigger than the sides of the Indian's birch bark canoe; they are fully as picturesque yet. Nothing stirs the primitive instinct of man as to be given a new land to explore. The north shore of Lake Superior is an untrodden wilderness. A passenger boat has just begun to nose along its bays and native harbors. There are thousands of persons who are eager to spend money to see these sights. Not alone the north shore of Lake Superior, but the beauties of connecting rivers, thousands of islands and natural harbors in all parts of the upper lake region.

It is quite likely that there may be developments in the strike of the engineers during the next two or three days, but at the present moment the situation is probably more complicated than it ever has been. With no substantial differences existing between the engineers and the owners it is unfortunate that the situation should have arisen. There is every reason to believe that it has been brought about against the wishes of Mr. Uhler, who is a very clear-minded gentleman. Last January the Marine Engineers Beneficial Association prepared a schedule of wages and classification of vessels for the consideration of the Lake Carriers' Association and gave it to Mr. Uhler to present to the vessel men. The singular thing is that the schedule of wages is in some respects lower than that which has been paid by the vessel men. Mr. Uhler submitted it and awaited a reply. None was sent him until last Saturday when the following letter was posted:

"At its first regular meeting the executive committee has taken up the subject of your communication of Jan. 26, 1901, and the proposals therein set forth, as you were advised it would be, by the chairman, and beg to say that this committee cannot discuss matters governing the management and administration of vessels controlled by members of the Lake Carriers' Association, and must decline to take up the subject of your communication as suggested. We may say, however, that on the opening of navigation there will be no change in the wage schedule adopted at the opening last year."

What the engineers were contending for, more than the adoption of their schedule of wages or their classification of vessels, was the recogni-

tion of their organization. This was one of the things that the vessel men felt they could not do; but it is plain to be seen in the adroit phraseology of the letter a disposition to let the letter be taken as an inferred recognition and an opportunity to bring about the end of the strike in a dignified and honorable manner. It was felt that as there is no question of wages really existing it would present a respectable avenue for the return of the men. There is no denying the fact, however, that the situation has been further complicated by the employment of engineers by some of the vessel men who were becoming restive as the season of navigation neared. These men have doubtless been employed in good faith and doubtless will be retained. It is unfortunate that the situation should have arisen at a time when there was no real excuse for its existence and it is to be hoped that cool and capable reasoning on both sides will bring it to a speedy termination.

The secretary of war has issued orders for the manufacture of a number of 12-in. Krupp armor plates, 8 and 16 ft. in length, to be used in constructing a representation of a side of a battleship to be used in tests that will determine the comparative effectiveness of the Gathmann torpedo gun. Duplicate structures will be erected from the plates, similar in every particular. Against one will be trained a modern 12-in. coast defense gun, throwing armor-piercing shells, which will be allowed ten shots. The inventor of the Gathmann gun, which expels a torpedo loaded with a high explosive, claims he can produce with one round as much destruction as can be done with ten rounds from an ordinary gun.

## PROGRESS OF NAVAL CONSTRUCTION.

The monthly summary of naval construction, which is the first that Rear Admiral Bowles has issued since he became chief constructor, shows the progress of the various battleships, cruisers and other war ships to be as follows:

BATTLESHIPS.		Degree of completion, Per cent.	
		Mar. 1.	Apr. 1.
Illinois	Newport News	90	90
Maine	Cramp & Sons	44	46
Missouri	Newport News	25	28
Ohio	Union Iron Works	39	39
Virginia	Newport News	0	0
Nebraska	Moran Bros. Co.	0	0
Georgia	Bath Iron Works	0	0
New Jersey	Fore River Co.	0	0
Rhode Island	Fore River Co.	0	0
ARMORED CRUISERS.			
Pennsylvania	Cramp & Sons	0	0
West Virginia	Newport News	0	0
California	Union Iron Works	0	0
Colorado	Cramp & Sons	0	0
Maryland	Newport News	0	0
South Dakota	Union Iron Works	0	0
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	40	43
Des Moines	Fore River Engine Co.	17	23
Chattanooga	Lewis Nixon	22	27
Galveston	Wm. R. Trigg Co.	15	17
Tacoma	Union Iron Works	17	17
Cleveland	Bath Iron Works	48	52
St. Louis	Neafie & Levy	0	0
Charleston	Newport News	0	0
MONITORS.			
Arkansas	Newport News	47	49
Nevada	Bath Iron Works	82	84
Florida	Lewis Nixon	62	63
Wyoming	Union Iron Works	71	73
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	90	92
Barry	Neafie & Levy	87	88
Chauncey	Neafie & Levy	88	89
Dale	Wm. R. Trigg Co.	91	92
Decatur	Wm. R. Trigg Co.	92	92
Hopkins	Harlan & Hollingsworth	71	73
Hull	Harlan & Hollingsworth	69	71
Lawrence	Fore River Engine Co.	99	99
MacDonough	Fore River Engine Co.	98	98
Paul Jones	Union Iron Works	85	87
Perry	Union Iron Works	93	93
Preble	Union Iron Works	85	89
Stewart	Gas Engine & Power Co.	50	51
Truxton	Maryland Steel Co.	58	64
Whipple	Maryland Steel Co.	57	63
Worden	Maryland Steel Co.	57	63
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsbrough	Wolff & Zwickler	99	99
Bailey	Gas Engine & Power Co.	99	99
Bagley	Bath Iron Works	98	98
Barney	Bath Iron Works	99	99
Biddle	Bath Iron Works	98	98
Blakely	Geo. Lawley & Son	98	98
DeLong	Geo. Lawley & Son	98	98
Nicholson	Lewis Nixon	85	86
O'Brien	Lewis Nixon	89	90
Shubrick	Wm. R. Trigg Co.	97	97
Thornton	Wm. R. Trigg Co.	96	97
Tingey	Columbian Iron Works	68	68
Wilkes	Gas Engine & Power Co.	77	78
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	5	6
Adder	Lewis Nixon	30	40
Grampus	Union Iron Works	10	22
Moccasin	Lewis Nixon	24	28
Pike	Union Iron Works	9	18
Porpoise	Lewis Nixon	18	24
Shark	Lewis Nixon	16	22

It is announced from Pittsburg that Wm. E. Corey, general superintendent at the Homestead works and other Carnegie properties, will in a few days be elected president of the Carnegie Co., to succeed Mr. Charles M. Schwab.



## ON THE SUBJECT OF LUBRICATION.

BY MR. W. H. EDGAR.\*

Among several conditions and requirements to be taken into consideration in selecting or making a good cylinder oil may be included first the steam pressure; then the amount of moisture in the steam; sometimes the make or type of engine, and the lubricator that governs the cold test, which is quite essential in obtaining and maintaining a high flash and fire test sufficient to meet the demands in the cylinder. The temperature of the steam produces a very heavy gravity and thick oil which must also be capable of feeding at as low as about 40° F. to give a sufficient cold test.

We will treat of dry steam free from moisture. Steam pressure under 100 lbs. should require a cylinder oil of not less than 590 fire test, nor more than 630. If under 590 it gradually volatilizes and passes away much quicker without rendering the wear and sufficient amount of lubrication. If over 630 it would not atomize freely, covering the surfaces, and instead of lubricating it would be more like a tar. Steam pressure of over 100, ranging from 110 up, say 140, 160 and 210, would require a cylinder oil of a fire test of about 645 to 660, which would maintain itself at this degree of temperature and give the proper amount of wear before volatilizing and gradually passing off. These oils, properly made, should have a corresponding flash test of 40 to 50° lower than the fire or burning test, to show that the physical properties in the make-up of the body of the oil are proper. These oils should carry a gravity of about 26.5° for 600 fire test down to 24.5° for 660 fire test. There should be a corresponding viscosity, ranging from 175° for 600 fire test to 205° for 660 fire test. It is quite essential that each test have its corresponding figure and relative bearing on each of the other tests.

The straight mineral Pennsylvania stocks will give these results with dry steam. Vegetable oils are of no use in cylinder lubrication; they are worthless and reduce the quality of the cylinder oil when found present. Animal oils are not necessary, except in the presence of moisture and to take care of moisture. Of the different animal oils, tallow is the best and the only animal oil that should be used in a cylinder. Tallow oil should be used in most cylinder oils, as invariably most of the steam is moist, especially in compound and triple expansion engines, where we get more or less moisture in the second and third cylinders. Tallow oil, which is acidless and refined, should always be used in compounding; not over 2 to 6 per cent. in the high pressure oils and not over 6 to 12 per cent. in the low pressure oils—that is, temperatures of the steam as given.

When an oil smells rancid or you detect the strong odor of common lump tallow, it should be rejected. In such case it is evident that tallow has not only been used to take care of the moisture, but to build up artificially the viscosity of the oil and to cut the gummy residuum nature of the cylinder stock in an attempt to better what is a poor condition of the mineral oil to start with, so that virtually your lubrication would come from the tallow. Lump tallow contains acid. This acid eats the steel and iron, grooves the metal, bolts, etc., causes a charred, gummy substance to collect in the cylinder, is carried over and forms a heavy oil deposit in the boilers of condensing plants, and should not be used. Another deleterious substance quite commonly found in cheaper cylinder oils is degrease (wool fat), which is used to cut this same gummy, sticky condition, so as to give flow to the oil in a cold test, and so that it may be fed through the lubricators. This causes a separation and a thickening deposit in the bottom of the barrels and also a similar sticky, charred substance in the cylinder. Sometimes an engine requires a filtered cylinder oil or an oil thinned down with some fine engine oil. This is due to extremely tight fitting of engine parts, but it is a condition seldom found.

All the better and high-priced oils come from Pennsylvania. There are of the very poor and consequently very cheap oils 1,000 tons of cylinder stock from Ohio to each one ton of Pennsylvania cylinder stock obtained in the general distillation and manufacture of petroleum products. Of course, the market is filled with cheap goods and every barrel is guaranteed by the man selling it to be Pennsylvania product. There is, therefore, but one course to take, and that is to thoroughly analyze and test all samples. In referring to this subject, I am sorry to make the statement that oils constitute one of the most corrupt markets in manufacturing lines.

Relative to engine, dynamo and other atmospheric surface lubrication, it may be stated that all journals, slides and machinery surfaces (considered high class or high duty lubrication) should be lubricated with straight mineral oils only, except in marine service or in plants where we come in contact with considerable water, the same as the engine pit, when it is quite advisable to use 30 to 40 per cent. of lard oil properly mixed with the mineral oil. This lard oil has the physical quality of mixing with the water and furnishing the kind of lubrication required; it retards high efficiency in lubricating results as compared with the viscosity or co-efficiency of friction test of the straight mineral oil. Vegetable oils have no lubricating properties whatever and are readily oxidized and destroyed with a very small amount of heat, and when exposed to atmospheric action. Animal oils thicken in the same manner when subjected to the dry warmth of the bearings and become quite sticky and gummy when exposed to atmospheric action—gather dirt and retard lubrication. Never use an engine oil that shows the presence of animal or vegetable oils. Animal and vegetable oils are sometimes introduced for the purpose of raising the theoretical tests, such as the viscosity and fire tests, and are known as loaded oils. Paraffine oil should never be accepted. Paraffine is used on ball room floors for dancing. It is a resistant. It is a product taken from engine oils. An engine oil having a cold test of 25° F. has had all the paraffine obtainable taken from it. It is chilled and coagulated and the oil drawn off, leaving the paraffine.

First test for engine oil—Shake it with a little caustic soda or soda ash solution. If it clouds up like soap, the presence of animal oil is shown. Reject this at once.

Second test—Take a bottle and place it in the ice cooler. The ice and water gives you 32° F. If this oil becomes cloudy we have proof that it is a common paraffine oil. There is no need of further test. Reject it at once. It will prove very expensive in the long run in the loss through filtering, and also in your bearings, as it will not stand the heat, and furthermore, it will not give you the lubrication.

In engine oils that have an opalescent green shading in the sunlight

and that are not a clear yellow or red, we have plain indication of the presence of kerosene and the lighter volatile hydro-carbons, which are not lubricants and which readily volatilize and pass off when brought in contact with the first heat units or warmer temperature of the bearing. There is quite a percentage of the lighter hydro-carbons so thoroughly intermixed—and a part of the heavier hydro-carbons—that it is impossible to drive off or get rid of them beforehand with heat in the stills. It is, therefore, necessary to have the absorption action of the atmosphere. This you would get with the bearings in your every-day lubrication and would consequently lose per volume. An engine oil should be perfectly clear and practically free from this opalescent green color, which shows that it has been debloomed. The oil should be run out into flat pans, open to the atmosphere (rain, sunshine and weather) and left there for some ten to fifteen days. The atmosphere will absorb and take the kerosene and lighter hydro-carbons from the main body of engine oil. The oil should then be drawn off and put through the filters and when clear can be returned to another still and distilled down to gravity. Besides this essential test we have the gravity test, the viscosity test and flash and fire tests. No one of these tests is of value except by relative comparison of any one with each of the other four.

Engine oils for high speed, high duty and heavy units, to properly and rapidly travel and to give the best results, should have a gravity of not over 31 nor under 28½°; about 30 and a fraction will give the best oil, provided the following tests are also present: Viscosity should not be under 160 and should range up to 190 at 70° F. This test is very essential when compared with the gravity and the others, but is dodged by most oil men because they cannot hold up. It is the indicative test of quality with comparisons. The flash test should not be under 390 nor over 430°, and the fire test should range 50° higher, that is, the fire test should be from 440 to 480° and a cold test of 30°.

An oil comparing favorably with the above tests and also complying with the above statements in appearance will give perfect satisfaction and will prove more economical by the month than the cheaper oils on the market. To do this, you must have a good filter and collecting pans, etc. An oil of this quality can be used over and over again, as there is no disintegration, nothing to coagulate and no part to volatilize, and there is therefore no loss except what is spilled.

## PENNSYLVANIA STEEL CO. BUYS IRON MINES.

The Pennsylvania Steel Co. has bought the entire stock of the Spanish-American Iron Co. and thus became the owner on April 1 of the iron mines of that company near Santiago de Cuba. These mines were developed by men who were originally engaged in mining in the Lake Superior region and considerable Cleveland capital was used in the original investments. The Pennsylvania Steel Co. is now in the course of reorganization. The company uses about 1,000,000 tons of ore annually and has bought in the past almost all of the product of the Spanish-American Co., about 325,000 tons annually. The price paid for the stock is reported to have been between \$1,500,000 and \$2,000,000. It is reported that there are unworked deposits in the mines which will bring the total yield annually to about 1,000,000 tons. At the annual meeting of the Spanish-American Co. this week the following directors were elected: Edgar C. Felton, who is president of the Pennsylvania Steel Co.; Charles F. Rand, who is the president of the Spanish-American Iron Co. and who will continue in that office; Evans R. Dick, Francis I. Gowen and F. W. Wood. Mr. Felton was elected vice-president of the Spanish-American Iron Co. The Pennsylvania Steel Co. is also interested in the Auburn Steel Ore Co., with iron mines forty-five miles west of Santiago, from which property the first ore shipments are expected within two months. These purchases mean that the Pennsylvania Steel Co. has come into control of practically all the iron mines in the province of Santiago. The property purchased from the Spanish-American company includes the Lolla and Magdalena groups of mines, not far from Santiago de Cuba, and the Providencia, Berraco and Fausto groups, which are being developed; a line of railroad from the mines to the sea, about 4½ miles; the entire seaport town of Daiquiri, with its harbor and steel loading pier extending into Daiquiri bay; in all about twenty mining claims and 5,000 acres of land.

## SUBMARINE WIRELESS TELEGRAPH.

A method of submarine telegraphy, known as the Mundy system, and which it is claimed will eventually be turned to advantage in the navigation of ships in fog was tried on Saturday last off the coast of Massachusetts in the presence of representatives of the United States and Canadian governments. The device is a submerged bell operated by electricity, the sound being carried by submarine telegraphy without wires to a distance of several miles and caught by submerged receivers connected with telephones on board the vessel seeking port, or to be warned of danger of any kind. In the experiment of last Saturday two bells were submerged about 20 ft. below the surface of the sea and connected by electric cable with the experimental vessel. In practice they are to be operated by cable from the shore. The steamer with the invited guests on board left the bell ship and steamed out to sea. At different distances a receiver with twelve "ears" was dropped overboard to a depth of about 12 ft. and connected with telephones in the pilot house. At three miles the bells were heard even more clearly than at a quarter of a mile. At ten statute miles the sound resembled a short, sharp rap, like striking one's knuckles upon wood. The experiment was considered satisfactory, but the inventor intends changing the tone of the bells so as to convey the metallic sound, which was lost somewhere between the four miles and ten miles test. The plan for harbors is to submerge two bells of different tones at some distance apart, the safe channel lying between them. By the receiving apparatus and a chart of sounds connected with it the pilot will be able to steer with safety, it is claimed, in fog. The principle of the Mundy submarine wireless telegraph is similar in a general way to that of the Marconi aerial wireless telegraph, but the details of the two systems are unlike. Modifications of the system will be sought for the purpose of preventing collisions in fogs; to enable signals to be exchanged between ships through the water, and keep lightships in communication with the shore.

\*Mr Edgar is president of the Dearborn Drug & Chemical Works, Chicago.

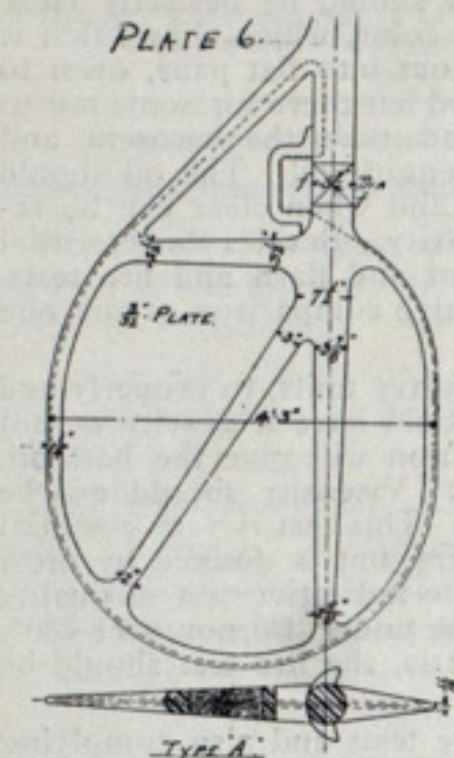


## CONSTRUCTION OF TORPEDO BOATS AND DESTROYERS.

BY GEORGE HERBERT WILSON.

## RUDDER AND DETAILS.

Departing from the consideration of the structural work of these boats for a time, I will endeavor to outline some ideas regarding the construction of rudders, rudder bearers and stuffing boxes, rudder carriers, tillers and quadrants. The items enumerated will, I think, cover the whole ground of matter relating to rudders. Separating the group into its several parts and commencing with the most important, the rudder comes into prominence as the subject first to be discussed. Considering the important work devolving upon the rudder and the responsibility of its functions, it must needs be the object of considerable attention in the designer's hands and requires the most thorough care in workmanship and erection.



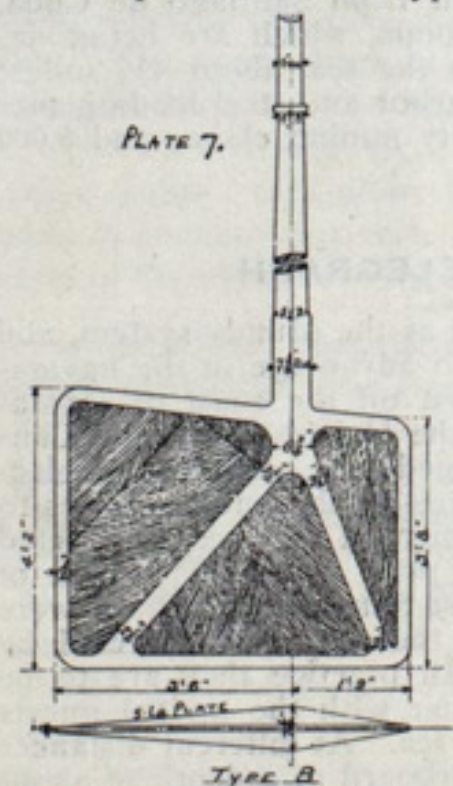
The designing of a rudder from a theoretical standpoint would be somewhat out of place in this work, treating as it does of the practical considerations of a boat. A summary of the theoretical problems giving such data as the pressure on the rudder for the maximum angle, the stress and torsion on the stock and the weight to be carried by the carrier will suffice for the construction of the different parts along the best lines. These items are of a variable character, depending upon the size and speed of the boat in question. It seems wise, therefore, to define the characteristics of a boat with its relative rudder values and to confine the sketches and outlines to each particular boat. Following out this idea, I have prepared a table which is shown below.

In dealing with rudders on the boats under consideration, the balanced type will play an important part as it is the exception when the other style is used. In all the boats represented by types A, B, C, D, the balanced rudder was used. It will be noticed that in the rudders dealt with in this article, a departure from the old rule regarding balanced rudders has been made—I refer to the ratios of balancing areas or surfaces. The customary practice has been to make this ratio about 2 to 1, this bringing the center of pressure on the axis. Dynamometer test has fully proven this fact.

	A	B	C	D
Length, ft. ....	101.5	160	225	248
Displacement, tons ....	65	142	340	408
Speed, knots ....	20	24	30	29
Pressure on rudder at max. ang., lbs. ....	9,926	18,072	61,687	53,550
Turning moment about axis, ft. lbs. ....	1,588	1,807	1,233	17,671
Bending mom't about bearing, ft. lbs. ....	17,870	36,150	166,500	133,875
Frictional moment of rudder, ft. lbs. ....	866	1,556	5,198	4,644
Weight of rudder, lbs. ....	837	1,344	3,316	3,550
Area forward of axis, sq. ft. ....	3.77	6.56	9.5	7.7
Area abaft of axis, sq. ft. ....	11.00	12.25	27.9	26.5
Area total, sq. ft. ....	14.77	18.81	37.4	34.2
Ctr. of pressure abaft of axis, ft. ....	.16	.10	.02	.33
Ratio of balancing surfaces ....	3 to 1	1.8 to 1	2.9 to 1	3.4 to 1

## TYPE A.

The rudder which this type represents was put on one of the smaller boats built and this construction has been followed in some of the later destroyers. The balanced idea is followed out in this as in the other rudders and the balancing surfaces proved very efficient in their ratios. The departure in this type is in the fact of it being the overhung style and in an unprotected position. The other rudders shown are not in sight and gain protection thereby, while the overhung-stern type affords somewhat of a target. As in the other rudders shown, the weight is carried at the deck with a bearing below. The rudder was supported by a shoulder on the stock, which rested on the carrier, the carrier in turn resting on the deck bearing. The lower bearing was made in two parts, one of which was riveted to the hull structure, the other half bolting to it. The recess shown in the rudder on plate 6 allows for the proper assembling of this bearing. In the wake of this bearing two lugs were forged on the stock, as shown, these lugs bringing up against a stop on the bearing casting, forming a very efficient "rudder stopper." The stock and arms are made of one forging of hammered scrap iron and the ends of the arms and the frame were welded to it. Side plates of 4 lbs. per ft. were used and the spaces were filled in with white pine. A generous application of red



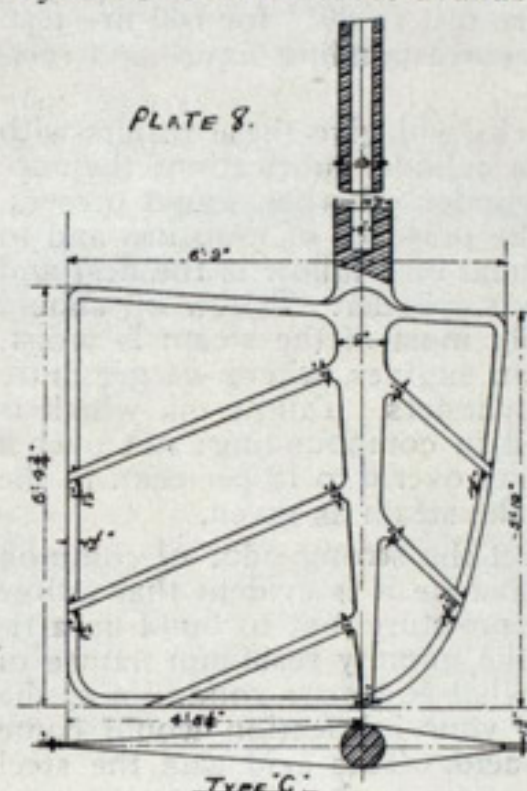
lead to all the parts before assembling insured protection from the corrosion. The motive power for steering these boats was hand, as they were not considered of enough displacement to warrant the installation of steam plant. A lifting eye is provided at the top of the rudder stock. The stock was made square at this point to receive the tiller.

The great advantage of this type of rudder is the ease in shipping and unshipping. This can be accomplished without going into a dry dock—either under the shears or by means of a hoist on deck. It is questionable, however, if this consideration should outweigh the fact of the rudder being in an unprotected position, which in these boats is a matter of great importance. During the progress of the trial this rudder proved very efficient and as all the steering was done by hand the action of the rudder was very easily noted. Some doubts have been expressed as to the advisability of using this type of rudder with a single screw boat, but it served to operate in this case as well as in the twin screw type.

## TYPE D.

This style of rudder was employed in boats of about 140 ft. and 160 tons displacement, as shown in the tables. Gaining somewhat by experience abroad, the builders of this type of boat changed the ratios of balancing surfaces, reducing the pressure area forward of the rudder stock and increasing that abaft of it. On the trial, when maneuvering for rudder tests, the rudder proved very satisfactory and was accepted by the trial board. This foresight on the part of the builders proved of great importance and was probably the means of a great saving in further expense. The proof of this was shown in another boat of a somewhat similar type on which the rudder as originally designed was carried. On the trial of this boat the rudder failed in nearly every respect. With the helm "hard over" the rudder could not be returned to its original position without reducing the speed of the boat, and for small angles the amount of work required to operate made the rudder of little practicable value. The builders were compelled to alter the shape of the rudder in question at a great expense. The change in shape effected a reduction of area forward of the center of the rudder stock and likewise a change in the ratio of the balancing surfaces.

This rudder was built up of hammered scrap iron in the shape shown on plate 7. The main forging was first made, consisting of the stock with the stumps of the rudder arms. The length of these arms is determined by the size of the lathe available for trimming the stock. After trimming the stock the frame was welded to the stumps mentioned. This makes a very strong and efficient rudder, but entails considerable cost in the forging. The usual method of side plates was followed, rivets being used where possible and taps elsewhere. In the spaces between the arms, white pine was fitted and a good coating of red lead applied to all inaccessible parts. Both sides of the rudder were well caulked, thus making a water-tight job. Holes for swinging the rudder, shown on the sketch, were placed in the most convenient position. Faces for bearings, shoulders and collars are turned on the stock to take their respective parts. In the top of the stock is fitted an eye bolt for lifting. In the wake of the rudder bearing a brass sleeve was shrunk on the stock and was further secured by brass screws. The position of the rudder being under the stern gives it a certain amount of protection from gun fire, etc., but it has not the advantage of easy shipping.



From the table some idea can be gained as to the pressure on the rudder, and when the greatness of this is considered the necessity for a stock of such diameter is readily seen. With the rudder at the maximum angle and going at full speed, the bending moment where the stock joins the rudder proper is enormous, and only a large section and the best material can be relied upon to resist the strains.

## TYPE C.

This type portrays a rudder used on one of the high-speed boats being built, and the radical departure in pressure moments and weights from the types mentioned above will be seen at a glance. The great increase in speed and the larger displacement made it necessary to install a rudder of larger dimensions. The increase in area, combined with the speed, materially aids in bringing the pressure on the rudder up to the enormous amount, for a small boat, of 63,000 lbs., or about 30 tons.

It has been found when rudders were designed in accordance with the old ratio of balancing surfaces of two to one that the center of pressure was along the line of the axis of the rudder. This does not, however, hold good where a change is made in this ratio. To my knowledge there seems to be no definite rule for determining the center when such a change is made. The general practice is to assume the center of pressure to be in a line one-third of the length of the rudder from the leading edge. My contention has been that a certain deduction or addition must be made proportionate to the change made in the area forward and abaft the axis from the original rule of two-thirds to one-third. I have, however, followed the general practice in computing the moment of pressure about the axis or the turning moment of the rudder. It will be seen from the table that this rudder, although having a relatively larger pressure, has but a nominal increase in its turning moment, from the fact of its center of pressure lying in a plane close to the axis. The strength of this rudder and the size of the quadrant and tiller for turning it is, however, brought up to a point which tends to support the assertion that the center of pressure is but an estimated one, the correctness of which has not been verified.

Departing from the consideration of this weighty subject, I will endeavor to outline the construction of this rudder, assuming the values as shown in the table. Following the general practice, the stock and arm stumps were made of a forging of hammered scrap iron, the extension arms being welded thereto. The frame of the rudder was made in separate pieces and merely acted as a liner and stiffener to the outer edge. Before welding the arms to the stumps the stock was bored out. A 4-in. axial hole for nearly the entire length made a considerable decrease in the weight, and still left all the strength required. Side plates of 7 lbs. per square foot were used, and the rudder was then filled with pitch, holes for filling being fitted in one side of the plate. Taps and rivets were used, as is general, and the usual method of caulking for water tightness was followed. A brass sleeve was shrunk on in the wake of the lower bearing. The quadrant was keyed on and the tiller fitted over the hexagonal head on the rudder stock. A lifting eye at the top of the stock was provided as usual. This rudder was carried at the deck like the other rudder and the main bearing was at the shell. On all the trial runs this rudder has given great satisfaction and the boat steers very easily.

The next of these articles will be devoted to a continuance of this subject with some other details.



## NOVELTY IN SCOTCH SHIP BUILDING.

THE WOODEN VESSEL DISCOVERY, BUILT FOR ANTARCTIC SERVICE, IS SAID TO BE THE STAUCHEST VESSEL IN THE WORLD—THE NEW ADMIRALTY PROGRAM OF GREAT BRITAIN.

[Special correspondence to the Marine Review.]

Glasgow, Scotland, March 28.—One of the most interesting products of the ship builder this year has just been put into the water at Dundee, namely, the Antarctic exploring vessel *Discovery*. As some very inaccurate descriptions of this vessel and her purpose have found their way into the English papers, readers of the *Marine Review* may be glad to have the facts direct from the land of her birth. And, perhaps, Americans may wonder why resort should be had to Dundee (best known for its manufactures of jute and marmalade) for a vessel for the Polar regions. The fact is that for generations Dundee has been closely associated with the whale and seal fishing of Greenland and the arctic circle and has built and maintained a whaling fleet of her own. Exactly how she got into the trade to begin with is not very clear, but at any rate in Dundee are to be found more experts in the art of ice navigation than elsewhere in the kingdom. And so it has come to pass whenever an arctic expedition is projected the promoters at once turn to Dundee both for craft, navigators, harpooners, ice masters and crew. Some years ago a number of Dundee people and others projected a whaling expedition to the Antarctic in the hope of finding there the "right" whale in payable numbers. They were led to think this probable from what Sir James Ross had reported in his narrative of the voyages of the *Grebus* and *Terror* in 1839-1843. Therefore, they fitted out a well-known Dundee whaler named the *Balaena* and sent her south in 1892. She returned in 1893 without

### The Strongest Wooden Vessel ever built.



The barque-auxiliary-screw "*Discovery*," built at Dundee, Scotland, 1901.

having found the "right" whale, but with such information about the Antarctic as stimulated the desire to thoroughly explore the unknown region. The desire has been very pronounced in Scotland, where the lead in the project which has now found definite shape was taken by Sir John Murray, Edinburgh, of the famous Challenger expedition. A plan was formed to send out a specially built ship with a specially selected crew and an expert party of scientists to spend three years within the Antarctic circle and on the Antarctic continent—if there is one, and not a mere agglomeration of ice, or the terrible pool into which Edgar Allan Poe's friend, Arthur Gordon Pym, found his way after fighting with jet black savages whom nobody has ever seen since. For such an expedition, fully victualled and equipped for three years, a sum of £120,000 was calculated to be necessary. Someone offered £500 to give it a start, the government promised £45,000, the geographical societies of London and Scotland gave liberal subscriptions, and enough money was raised to inaugurate the National Antarctic expedition. When ways and means came to be discussed, it was resolved to build an entirely new type of vessel, specially designed by the chief constructor of the admiralty, and it was also resolved to have her built by the Dundee Ship Builders' Co., from whose yard has been launched many a stout whaler and gallant exploring vessel for the Arctic circle.

The present *Discovery* is the sixth exploring vessel of the name, and most, if not all of them, were built at Dundee. This sixth representative of the name is the strongest and most complete vessel ever constructed for a scientific purpose. She will become as famous as Nansen's *Fram*, than which, however, she is much longer. In these days of iron and steel—especially steel—it is interesting to note that the *Discovery* is really a triumph in timber construction—a return to the old wooden walls. In length she measures 178 ft., in width 34 ft., in depth 20 ft., and her displacement is 1,500 tons. But what is remarkable about her is the tremendous solidity, combined with buoyancy, which has been provided to enable her to resist the greatest conceivable amount of ice pressure. Her hull is a veritable wooden wall, 2½ ft. thick, hardwood, sheathed in greenheart and iron bark. Her stem is an ice ram of solid oak 9 ft. thick. The frames are of solid oak, averaging 12 in. in thickness, and the butts and sides are pommelled and bolted together. Of similar strength are the beams of carefully selected timber. For additional strength in resisting ice pressure there are a number of solid transverse bulkheads. In the designing of the hull the idea of the *Fram* has been utilized, though modified in such a way that when the *Discovery* is nipped by the ice she will not be caught and submerged, but will lift herself clear and ride on top.

There is, of course, special protection for rudder and screw in such emergency, and for hoisting them on board, out of harm's way.

The *Discovery* is primarily a sailer and is barque-rigged, but to be independent of the wind in the ice region she is fitted with a propeller and engines developing 450 I.H.P., which are being provided by Gourley Bros. & Co., Dundee. For the purpose of deep sea dredging at great depth she is fitted amidships with a powerful steam windlass. And another remarkable thing about this very remarkable vessel is that she is provided with a roof to be put on as a covering from snow and wind when she is laid up for the winter in the Antarctic circle. Internally she is fitted with double doors and air locks between all the compartments, so as to prevent cold blasts in the living apartments and in the work rooms of the scientists. The laboratory and work rooms are on the upper deck; the crew's quarters, and the quarters of the officers and scientists below. She is electric-lighted throughout and the dynamo is so arranged that it may either be driven by steam or by wind. There is storage for three years provisions and for a suitable amount of coal. The company will number upwards of forty, and will be under command of Capt. R. F. Scott, R. N., late of H. M. S. *Majestic*, with Lieut. A. F. Armitage, late of the Peninsular & Oriental Co., as first officer, and Lieut. C. W. R. Royds, R. N., as the third officer. The engineer in chief is M. R. Skelton, R. N. The chief of the scientific party is Prof. Gregory of Melbourne University, and among experts with him will be Dr. Koeltitz, who was with the Hansworth-Jackson expedition to Franz Josefland.

The whole outfit of the *Discovery* will be completed at Dundee, from which port she will proceed to London for her stores, leaving there in July for Melbourne, where the final arrangements will be effected. If all goes well she should not be back in British waters before the summer of 1904, and, of course, every man on board of her expects to bring home a solution of the South Polar mystery.

### THE NEW ADMIRALTY PROGRAM.

In the new admiralty program, to which some reference was made in the last letter, provision is made for a new arrangement with some of the leading steamship companies, whereby their best vessels are to be held at the disposal of the government in time of war for employment as armed cruisers. Previously only the Cunard, White Star, Peninsular & Oriental and Canadian Pacific companies were under this obligation. Under the new arrangement the following steamers will receive a fixed annual subvention, or retaining fee, for a term of years:

Vessel.	Company.	Tonnage.	I. H. P.
Oceanic.....	White Star.....	17,274	28,000
Majestic .....	do. ....	9,955	16,000
Teutonic .....	do. ....	9,984	16,000
Campania .....	Cunard.....	12,950	30,000
Lucania .....	do. ....	12,952	30,000
Umbria .....	do. ....	8,128	14,500
Caledonia .....	P. & O.....	7,558	10,000
Persia .....	do. ....	7,951	9,400
Arabia .....	do. ....	7,903	9,400
India .....	do. ....	7,911	9,400
Omrah .....	Orient.....	8,291	10,000
Ophir .....	do. ....	6,910	10,000
Danube .....	Royal Mail.....	5,946	6,650
Nile .....	do. ....	5,946	6,650
Ortona .....	Pacific Mail.....	7,945	10,000
Empress of India.....	C. P. R.....	5,905	10,000
Empress of China.....	do. ....	5,905	10,000
Empress of Japan.....	do. ....	5,905	10,000

But it provides that the same companies have to hold at the disposal of the government the following vessels without any subsidies at all:

Vessel.	Company.	Tonnage.	I. H. P.
Britannic .....	White Star.....	5,004	4,900
Germanic .....	do. ....	5,071	6,000
Gothic .....	do. ....	7,755	—
Cymric .....	do. ....	12,647	7,300
Medic .....	do. ....	11,985	—
Etruria .....	Cunard.....	8,120	14,500
Servia .....	do. ....	7,392	10,000
Aurania .....	do. ....	7,269	9,500
Ivernia .....	do. ....	13,800	10,000
Saxonia .....	do. ....	13,963	10,000
China .....	P. & O.....	7,942	9,400
Egypt .....	do. ....	7,912	9,400
Himalaya .....	do. ....	6,898	7,650
Australia .....	do. ....	6,901	7,650
Victoria .....	do. ....	6,527	6,000
Britannia .....	do. ....	6,525	6,080
Arcadia .....	do. ....	6,603	6,080
Oceana .....	do. ....	6,603	6,080
Ormuz .....	Orient.....	6,387	9,040
Austral .....	do. ....	5,524	7,000
Orient .....	do. ....	5,631	8,000
Thames .....	Royal Mail.....	5,645	5,740
Clyde .....	do. ....	5,645	5,740
Tagus .....	do. ....	5,545	5,740
Trent .....	do. ....	5,573	5,740
Magdalena .....	do. ....	5,362	5,600
Atrato .....	do. ....	5,366	5,600
Orizaba .....	Pacific Mail.....	6,298	6,000
Oroya .....	do. ....	6,297	6,000
Aravia .....	do. ....	5,321	4,200
Tartar .....	C. P. R.....	4,425	4,900
Athenian .....	do. ....	3,882	4,600

The government thus obtains provisionally the use of fifty of the finest and largest ocean steamers of the world by subsidizing (and that moderately) only eighteen of them.

Since the last letter a contract has been booked by A. Rodgers & Co., Port Glasgow, for a four-masted sailing ship of 5,000 tons for the Anglo-American Oil Co. This vessel will be a sister ship of the *Comet*, recently built by Wm. Hamilton & Co., Port Glasgow, for the same owners for the carriage of case oil between the United States and the far east. It is reported that Russell & Co., Port Glasgow, are to build another of the same size and type.



## ITALIAN BATTLESHIP OF NOVEL TYPE.

From the Engineer, London.

The new Italian battleship Vittorio Emanuele III represents a novel or practically novel type, there being no ship that she can be described as an evolution of, except possibly the now abandoned Amalfi design. This was, however, merely a sketch design of the Vittorio Emanuele in little. She never got beyond the paper stage, whilst the Vittorio Emanuele is to be begun as soon as possible at Spezia, and a sister, the Regina Elena, at Castellamare. As this new battleship has grown out of the armored cruiser, it may be interesting to give the principal data of both side by side.

	Vittorio Emanuele.	Amalfi.
Displacement.....	12,625 tons	circa 8000 tons
Length.....	435 ft.	400 ft.
Beam.....	73½ ft.	—
Draught.....	25½ ft.	—
Main Armament.....	two 12-in.	nil.
Secondary armament.....	twelve 8-in.	twelve 8-in.
Tertiary armament.....	twelve 3-in.	twelve 3-in.
Minor armament.....	twelve 3-pounders	twelve 3-pounders
Torpedo tubes—		
Submerged.....	four	two
Above water.....	—	four
Armor material.....	Terni	Terni
Belt.....	10-in.—4-in.	6-in.
Deck.....	4-in.	3-in.
Splinter deck.....	2-in.	—
Bulkheads.....	8-in.	6-in.
Barbettes.....	8-in.	6-in.
Barbette hoods.....	6-in.	6-in.
Side.....	6-in.	6-in.
Eight in. turrets.....	6-in.	6-in.
Conning tower.....	10-in.	6-in.
Indicated horse power.....	20,000	19,000
Speed.....	22 knots	22 knots
Coal, normal.....	1000 tons	700 tons
Coal capacity.....	2800 tons	1500 tons
Screws.....	two	two

Reports have been circulated to the effect that the Regina Elena will carry three 12-in. guns and be of different dimensions, but this is fiction; the two ships are to be identical in every respect. It remains to add that the tank trials of the model have given a speed of 23 knots; the plan is to have the 12-in. guns each singly in axial turrets, the 8-in. in pairs in turrets, eight on the main deck and four on the upper deck—exactly the proportion observed in all British battleships from the Majestic to the Duncan class.

A glance at the comparison given above will indicate that the "paper value" of the Vittorio Emanuele at 12,625 tons is not relatively quite so great as the Amalfi idea at 8,000. Practically the difference between them resolves itself into two 12-in. guns, four extra inches of armor in a few places, and 300 extra tons of coal at the normal. The bunker capacity is, however, enormously increased, and the resulting product is a ship infinitely better fitted for Italy's needs. All the armor is of Terni make, and equal, if not even superior in resisting value, to armor made on the Krupp system. Some excellent results have recently been achieved with Terni armor, and it is curious that it should have attracted so little attention in this country.

The total abolition of military masts and the substitution of a light pole rig will be noticed. This is a wise step, for the ordinary military mast is undoubtedly a dangerous addition to a ship. Its sole military value lies in the advantage of the high platforms thus provided for search-lights, but these can be carried on poles. The gun fire from tops is trifling, and the record of the Yalu is that a fighting top is the most dangerous part of a ship in action. Every badly-aimed projectile is likely to pass near it, whether it has gone too high all along, or whether it rises from a ricochet. In the Belleisle even the little pole masts were badly hit, the main, indeed, having remained standing only by pure chance, or because the ship was stationary. Ordinary military masts would have fallen and smashed the lesser deck artillery; or, had the ship been under way, gone over the sides and probably fouled the screws. Even for signalling their use is doubtful, since few designs afford any protection to the signalmen, who have to work with "shell traps" all around them. Small captive balloons could probably be made of greater utility; as things are, masts and funnels are merely so much vulnerable stuff for an enemy's guns. Nor is it at all clear whether a ship having had these destroyed will be anything but practically out of action. She will certainly be forced to leave station, and no longer be one of the fleet, acting as a single weapon; and four ships acting as one are probably of more danger to the enemy than six or seven that are each acting in blind independence. This is the most tangible lesson of the last two thousand years.

Of course, the main feature of the Vittorio Emanuele is the apotheosis of the 8-in. quick-firer and the extinction of the 6-in. It is a bold move forward. Of its wisdom we are by no means sure. The change has, we know, been strongly advocated by various people, but they are chiefly of what we may term "navy league" calibre. When the 6-in. came into use 6-in. compound armor was equal to approximately 9 in. of iron. It presently, through the Harvey process, became equal to about 12 in., and defeated the 6-in. projectile. Then it was observed that an 8-in. piece was necessary to get through 6-in. armor, and the 8-in. was called for. In the meantime 6-in. armor rose to equal 15-in. iron, and now, by Krupp process, 18-in., a thickness that in practice the 8-in. gun will affect no more than a 6-in., or for that matter a pea-shooter, so far as penetration is concerned. To penetrate, then, the 8-in. is useless.

The question therefore resolves itself into one of shell fire. For her twelve 8-in. the Vittorio Emanuele could carry from eighteen to twenty-two 6-in., and though the effect of an 8-in. shell is relatively more than that of two 6-in. (according to the observations of American officers), the smaller guns would send so many more shell that they stand to hit sooner. It is well to hit the enemy in a vital spot, but it is improbable. It is not so well to hit him in a non-vital place, but it is far more probable, and it will count. There is a naval doctrine that "no matter where you hit it will do and count something," and there is a practical ring about this

proverb in these days of shell. Even more important than hitting somewhere, is to hit first and most often. And there is a growing conviction that when a casemate is hit by a 6-in. shell that stops outside, that casemate will be out of action. Bolts and nuts must fly; gun muzzles are tender things, while lyddite fragments fly with an abnormal energy. If one fragment hits a gun there is at least a chance that the gun will blow its muzzle off next time it is discharged. It is a matter that could be definitely settled by experiment, but there seems no initiative in testing things of this sort. Ninety-nine per cent. of all experiments consist in subjecting armor to tests that it is ten thousand to one it would never receive in battle. No guns, save big ones, are ever likely to be concerned with penetration in battle.

A feature of the Vittorio Emanuele is her relatively low freeboard, though she is higher forward than other Italian battleships, which, built as they are to operate in peaceful waters, do not need much freeboard. The raised bow is advantageous for high speeds, and the ship is certainly a flyer, the more so as the model implies a speed of 23 knots, that is to say, this battleship will equal the swiftest armored cruiser building. She is weak in heavy guns, but the four upper-deck 8-in. represent an equivalent weight, and are presumably chosen in preference to a couple more 12-in. guns. Altogether the ship represents something new in naval architecture. Italy gave us the "protected cruiser" in the Italia and Lepanto; she has now given the world a new idea for battleships. It remains to be seen whether other nations will follow suit. If they do, if 22-knot battleships are to be the order of the day, all armored cruisers as we have them—built or building—will have lost their raison d'être, for this new Italian design is a bold attempt to do away with compromise and specialization, by putting all the qualities most needed for war into one ship. Whether the idea is sound we cannot say; but there is a balance of probability in its favor. In any case, if the Vittorio Emanuele is a success she will profoundly affect the future of warship designs.

## BUSINESS OF NORTH GERMAN LLOYD CO.

The North German Lloyd Steamship Co. has appealed to its share holders for permission to increase its capital stock by £500,000 and to issue £1,000,000 worth of 4½ per cent. bonds. If these issues are allowed the capital stock of the company will be £4,500,000 and the bonded capital £2,255,000. The following synopsis of last year's business is interesting:

For the transatlantic lines, £1,089,220 (an increase of £530,000); Imperial mail lines, £104,120 (decrease, £82,250); European lines, £30,800 (decrease, £1,920); underwriting surplus profits, £65,660 (decrease £84,170); profit on sale of ships, £2,830 (decrease, £2,010); other receipts, £77,230 (decrease, £11,000). The interest and general expenses absorbed £140,916 (increase £10,850); depreciation account, £686,720 (increase, £293,260); underwriting reserve and renewal account, £174,700 (decrease, £7,780); withdrawals from renewal account, £15,620 (decrease, £76,380). The increased profit on the transatlantic lines results from the increased freight from the new steamers put on the lines during the year and a considerable increase in the number of passengers carried, including troops—from £197,226 to £253,225, an increase of £55,999. The decrease in the receipts from the Imperial mail service resulted chiefly from the effect of the Chinese difficulties in the passenger and freight business, and also from the decrease of wool freights on the Australian line.

## RUSSIA ASSISTING ITS MERCHANT MARINE.

The Russian government has been assisting its merchant marine in various ways, and as a result, according to a report to the state department by Consul John E. Kihl of Stettin, there has been a very rapid increase in the merchant fleet under the Russian flag. He says:

"A few years ago this fleet consisted of a very few steamers and about 200 Finnish sailing ships, employed almost exclusively in the Baltic wood trade. Today more than 3,050 steamships (including river steamers) are flying the Russian flag on their after-deck staff. The government is keenly alive to the value of a merchant marine and only recently enacted a law limiting its coast trade to its own bottoms. Government aid is not confined to such laws. For several years Russia paid all the Suez canal dues on her bottoms bound from European Russia to ports in Asiatic Russia, and on steamers bound to an Asiatic foreign port the government pays two-thirds of the canal dues. Many new steamship companies are springing into existence; for instance, the Russian Orient-Asiatic Co., and the Russian Steamship Co., which is the most important, having a fleet of sixty-five steamers. The Volunteer Fleet is also an important company, having six large express passenger steamers and ten freighters, aggregating 96,000 tons, and having added to her fleet within the last year a 14,000-ton freight steamer called Moscow."

## NEW NAVAL COALING STATION.

The first United States coaling station to be located on foreign soil has just been completed at Pichaliqui, on the west coast of Mexico, and the collier Alexander is now taking on 5,000 tons of coal at Baltimore for this latest acquisition of the navy. The station is on California bay, at the extreme end of the long peninsula which juts down from California, and is known as Lower California, although it is an integral part of Mexico. Admiral Bradford, chief of the naval bureau of equipment, has long been seeking to develop this point for the use of the navy. A footing was secured there many years ago through the assent of the local authorities, but it was desired that the Mexican government should give its full authorization to the work contemplated by the United States. Through the state department extended negotiations were carried on with Mexico, resulting finally in complete authorization for the projected station. The work has been in progress for some time, about \$25,000 being expended in coal warehouses, docks, slips, and in the most modern facilities for loading coal upon ships of war.

Capt. Oliver Maisonville, who lived at Walkerville, Ont., died Monday of this week at the age of eighty-one years. He was a sailor on the great lakes for fifty-seven years and was for many years the captain of the Grand Trunk car ferry Great Western. It is said that he was the captain of the first railway transfer that crossed the Detroit river, as also of the first that crossed St. Clair river. At the time that he began sailing the Canadian shore was a wilderness.



## SHIP BUILDING IN NEW ENGLAND.

THERE IS TO BE NOTED A REVIVAL IN THE WOODEN SHIP BUILDING INDUSTRY, THE LIKE OF WHICH HAS NOT BEEN KNOWN FOR A DECADE.

Ship building in New England continues on the boom. This relates, of course, to the building of wooden vessels, as there are only two or three yards in the New England district that build steel vessels. During the past year the Maine ship yards have sent forth one ship, sixteen barges, forty schooners, thirty-nine sloops and ten steamers, aggregating 106 vessels with a net tonnage of 56,403, and the record for all New England is 170 vessels of 67,501 tons, while the returns from the maritime provinces increase these figures to 191 vessels of 71,814 tons. The Maine ship yards have on the stocks or under contract, including vessels launched since the beginning of 1901, two ships, thirty-five schooners, eight barges, five steamers and numerous other craft, and in all New England there are now under construction 131 vessels with an aggregate tonnage exceeding 100,000; and in addition to this New England yards are working on government contracts (steel vessels) involving \$15,000,000, with a trial displacement of about 50,000 tons. Big wooden fore-and-afters have been features of the year, two six-masters having been launched, and eleven five-masters have either been launched or are under construction. Briefly below is noted the New England record of ship building activity:

David Clark of Kennebunkport, Me., is building a 500-ton schooner for John W. Deering of Portland, Me. The vessel will be used in the lumber coasting trade.

The Portland Ship Building Co., Portland, Me., are building a steamer for the Frontier Steamboat Co. to run between Calais and Eastport. The craft is to be 120 ft. long and is now in frame. She is to be completed by June 1.

Percy & Small, Bath, Me., have two schooners on the stocks. One is a five-master for the Percy & Small fleet. She is 250 ft. keel, 45 ft. beam and 21½ ft. depth of hold. She will have a carrying capacity of 3,800 tons. The second schooner is a four-master for J. S. Winslow & Co., Portland, Me. She is 190 ft. long, 40 ft. beam and 18½ ft. deep with a carrying capacity of 2,000 tons. Since the opening of the season this firm has launched the five-masted schooner Oakley C. Curtis. During 1900 they launched the six-master Eleanor A. Percy and the five-master William C. Carnegie.

The Bath Iron Works, Bath, Me., (steel plant), are largely concerned in government work. During the year three torpedo boats, Bagley, Barney and Biddle, and the monitor Nevada were launched. The firm has on hand the battleship Georgia and the cruiser Cleveland; and also a steel tow boat and a steel caisson, the latter for the Portsmouth dry dock. Improvements during the year have included the building of a new machine shop and the installation of two Ingersoll-Sargeant electric-driven compressors. The wharves are now being extended to provide for additional building slips and it is quite likely that the firm will be compelled to make even further extensions to provide for its growing business.

Arthur Sewall & Co., Bath, Me., is the firm that some time ago undertook the construction of steel sailing ships. They launched one, the Astral, for the Standard Oil Co. during the past year and have another on the stocks to be known as the Acme. These vessels are 332.3 ft. in length, 45.7 ft. broad and 26 ft. deep. It is the purpose of the Sewalls to build a third steel sailing ship, to be known as the William P. Frye.

The New England Co., Bath, Me., has on the stocks a four-masted schooner for the Weston Co., which is 160 ft. keel, 36 ft. beam and 13 ft. deep. She is now in frame. Another four-master is also under way, which will be 155 ft. keel, 56 ft. beam and 13 ft. deep. Keel has also been stretched for a five-masted schooner for William F. Palmer of Dorchester, Mass., to be known as the Prescott Palmer. The vessel will be 264 ft. on the keel, 46 ft. beam and 27 ft. deep. She will be a three-decker and will have a capacity of 4,400 tons. The company recently launched the Edith G. Folwell, a vessel of 1,051 tons. During 1900 the firm launched four schooners and six barges with an aggregate tonnage of 12,556.

Kelley, Spear & Co., Bath, Me., have on the ways a schooner of the following dimensions: Keel, 160 ft.; beam, 35.5 ft.; depth, 13 ft. and tonnage 530. The firm also has several barges under way.

William Rogers, Bath's oldest ship builder, turned out during the year two large schooners, one of them being the Marie Palmer, 1,594 tons, and the other the Maude Palmer, 1,529 tons.

The Bath district also includes the smaller towns of Richmond, Arrowsic, Topsham and Phippsburg, notably the latter where Frank S. Bowker launched two schooners during 1900 and another this spring, a three-masted schooner 145 ft. in length, the Seguin, built for the South Gardiner Lumber Co. C. V. Minott, also of Phippsburg, has been building a four-masted schooner of 210 ft. keel, 40 ft. beam and 19 ft. depth.

W. Irving Adams, East Boothbay, Me., is building a sailing vessel 94 ft. over all for Boston parties and two fishing vessels for Boothbay harbor parties. The fishing vessels will each measure 115 ft. in length and will each be equipped with an auxiliary gasoline engine. Rice Bros., East Boothbay, Me., are building a schooner yacht, 76 ft. over all, for a Boston owner, a sloop yacht 73 ft. for Taunton, Mass., parties, and two cabin launches, one of 68 ft. and the other 41 ft., the smaller of them being for the builders.

George L. Welt, Waldoboro, Me., built during the year the five-masted schooner Fannie Palmer for William F. Palmer of Boston. Her dimensions are: Length of keel, 257 ft.; length over all, 300 ft.; breadth, 44.5 ft.; depth, 25 ft.; tonnage, 2,075, and carrying capacity 3,700 tons. He has now in frame another five-master, to be known as the Baker Palmer for the same owner. The new vessel will be 5 ft. longer than the Fannie Palmer, 1.5 ft. deeper and 1.5 ft. wider.

A. & M. Gamage & Co., South Bristol, Me., are building a steamboat 60 ft. long for the Damariscotta Steamboat Co. and a sailing vessel 67 ft. long for Capt. Charles Huff of Biddeford Pool.

Washburn Bros., Thomaston, Me., have built four schooners at Thomaston during the past fourteen months, three four-masters and one three-master. The keel is laid and the stern-post up for another four-master. This firm will also build a five-master and the frame is now being cut.

The four-master now on the ways is of 190 ft. keel, 40 ft. beam and is 19 ft. deep. The coming five-master will be 220 ft. keel, 43 ft. beam and 19½ ft. hold, and is to be built for investment.

Dunn & Elliott, Thomaston, Me., built two schooners last year, the Thomas S. Dennison of 1,329 tons and the Republic of 680 tons. The large vessel was built for themselves and the smaller for P. H. Nye of New Bedford. The firm expects to begin work at once upon a four-masted schooner of 1,500 tons.

Cobb, Butler & Co., Rockland, Me., launched one schooner, the Geneva, during 1900, and early this spring the five-masted Rebecca Palmer, a craft of 2,135 tons and the largest ever built in Rockland. Her dimensions are: Length of keel, 251 ft.; length over all, 285 ft.; beam 46 ft. 1 in.; depth, 27 ft. The firm is now building a four-masted schooner to be commanded by Capt. Peter Crowley.

I. B. Snow & Co., proprietors of a marine railway and ship yard at Rockland, are building a three-masted schooner which they expect to launch in a few days. Her dimensions are: Keel, 107½ ft.; width, 31½ ft.; depth, 8½ ft. They are also cutting the frame for another schooner 115 ft. in length.

Carlton, Norwood & Co., Rockport, Me., are building a four-masted schooner 160 ft. keel, 36½ ft. beam and 13 ft. depth of hold.

H. M. Bean, Camden, Me., launched three great schooners during 1900. One of them was the George W. Wells, the first six-master ever built. The other schooners were the Malcolm Baxter, Jr., 1,530 tons, and the Van Alens Broughton, 1,905 tons. Mr. Bean is now building a four-masted schooner for Capt. Crowley. Her keel is 170 ft., beam 37 ft., and depth 18 ft. A five-master is also being built for the Crowley fleet of the following dimensions: Keel, 260 ft.; beam, 46 ft.; depth, 22 ft.

McKay & Dix, Bucksport, Me., built three vessels for the Greenland trade during 1900. They are the Thalium, 596 tons, the Edwin T. Stotesbury, 1,277 tons, and the George C. Thomas, 1,281 tons. The firm is intending to build a five-master.

Sawyer Bros., Millbridge, Me., launched during 1900 a three-masted schooner, the Ninetta M. Porcella of 466 tons and have contracted for two additional schooners, the keel of one of which has been laid.

E. W. White of Machias, Me., has on the stocks a three-masted schooner of about 325 tons.

The record for Massachusetts ship yards in 1900 was 3,086 tons. William S. Currier of Newburyport is building a five-masted schooner 226 ft. long for Capt. William E. Tilton of Manasquan, N. J. A. D. Story of Essex has five fishing schooners and two steamers on the stocks. Messrs. James & Tarr of Essex are building three schooners. Thomas Irving of Gloucester is building two schooners and J. Bishop and H. G. Bishop of Gloucester are also building two each. Reed Bros. of Fall River, Mass., are building the steamer Sagamore, 110 ft., for the Dyer Transportation Co. of Providence, R. I.

At East Boston in the yard of William McKie work is well advanced on the steamer City of Rockland of the Boston & Bangor line. This steamer is 300 ft. over all in length, 38 ft. beam and 60 ft. over guards. She will have a depth of 14½ ft. from the main deck. Her engines are being built by W. & A. Fletcher Co., Hoboken, N. J.

John M. Brooks, Harbor View, East Boston, Mass., is at work upon a schooner which in point of tonnage will be the largest afloat. She is being built for Capt. A. C. Crandall, the United States local inspector of steam vessels at Boston, and is 340 ft. over all, 300 ft. length of keel, 49½ ft. beam and 30 ft. depth of hold. Her gross tonnage will be 3,500 and her net tonnage 3,200.

The Holmes Ship Building Co., West Mystic, Conn., are building a five-masted schooner 250 ft. over all for the Sutton fleet of New Haven. Green Bros., Bridgeport, Conn., are building a four-masted schooner, 234 ft. in length for Bridgeport parties, three pleasure steamers and three oyster steamers. The Hartford & New York Transportation Co., Hartford, are building a twin-screw propeller for E. S. Belden of Hartford. S. Gildersleeve & Sons, Gildersleeve, Conn., are building a coal barge 135 ft. long for South Amboy, N. J., parties, and six barges ranging in length from 110 ft. to 125 ft. for New York parties.

Robert Palmer & Son, Noank, Conn., are busily engaged in constructing car floats for several railroads, a steam yacht for Pittsburg parties and a lobster steamer. They employ about 400 men.

## SHIP BUILDING AT CAMDEN, N. J.

Ship building at Camden, N. J., is thus epitomized: The first vessel to be constructed at the plant of the New York Ship Building Co. is well under way and it is expected will take its initial dip in the river the last part of the present month. It is being built for Robert Dollar for the Pacific carrying trade. The contract for building the ship will be given to the company in June last and it is possible that the vessel will be in service by fall. Seven other ships, varying in size from 310 to 625 ft. in length are also to be built by the company. The total displacement of all the vessels, including the one soon to be launched, will be 124,900 tons. They will have a carrying capacity of 75,000 tons. Two of these ships, whose length will be 625 ft., will be exceeded in length only by three of the Atlantic liners. The company expects several other large contracts shortly when the force of 1,600 men now employed in the yards will be considerably augmented.

At the yard of John Dialogue & Son two large wooden tugboats are on the ways building, the skeleton of a small steamer is being put together and a large barge is also being constructed.

The Bullock Electric Mfg. Co. of Cincinnati and the Wagner Electric Mfg. Co. of St. Louis have effected a combination of their selling organizations. The products of the two companies are totally different, but where the product of one is used, the other is likely to be necessary. The Bullock product consists of a complete line of direct and alternating current machines, from a ½ H.P. motor to a 10,000 K.W. generator; controllers of various types and rotary transformers. The product of the Wagner company covers a full line of static transformers of all types and of the largest sizes; ammeters, voltmeters, indicating wattmeters, switches, switchboards for all purposes and single-phase self-starting alternating current motors. The new selling organization will be under the management of Mr. E. H. Abadie, formerly sales manager of the Wagner company.



## TRADE NOTES.

The Fowler & Wolfe Mfg. Co., Bourse bldg., Philadelphia, manufacturers of wall and steamship radiators are equipping an entire new plant at Norristown, Pa., and expect to have the same in operation next week.

Owing to increase of business at Chicago the Bethlehem Steel Co. will on May 1 move its offices in that city to larger quarters in rooms 1520 and 1521 Marquette building, where Mr. E. Nelson, sales agent, will continue as representative of the company.

Frank J. Corbett was recently appointed assistant manager of the New York office of the Ashton Valve Co. of Boston. The New York office is at 121 Liberty street. Mr. Corbett will give special attention to introducing Ashton pop safety valves and steam gages among the architects and stationary engineers of Greater New York.

A catalogue from the Consolidated Boat Store Co., Nos. 222 and 224 East Front street, Cincinnati, dealers in steamboat supplies, is quite comprehensive. They deal in manila rope, oakum, caulking mallets, caulking irons, "Providence" power capstans, pumps, life boats, oars, life preservers and anchors, lanterns, canvas, and in fact everything in the way of equipment needed by ships.

It would seem from a circular sent out by E. A. Bunker of 20 Broad street, New York, that almost every vessel of large tonnage on the lakes is using Welford's waterproof cloth for hatch covers. Mr. Bunker is the agent for this cloth in the United States. A recent order from the Union Iron Works of San Francisco called for 700 yards of 40 in. width. It is used by the American line, Red Star line, Standard Oil Co. (transportation department), Southern Pacific Co. and many other well-known shipping concerns.

The American Bridge Co. will furnish the crown agents for the colonies of Great Britain the steel work for two deck-plate girder spans, and for strengthening two other bridges on the Jamaica government railway. The Berlin Iron Bridge Co., which is a part of the American organization, has contracted to furnish the province of New Brunswick, Canada, four bridges. There will be required four 63-ft. riveted spans, one 150-ft. through pin connected span, one 200-ft. deck pin connected span, and one 80-ft. deck pin connected span.

In one of the latest of the attractive pamphlets issued by the Peerless Rubber Mfg. Co., 16 Warren street, New York, a couple of pages are devoted to hose and tubing for pneumatic tools. Of this special produce the pamphlet says: "The inner tube is made of a special compound to withstand the action of oil and water, more or less of which is carried through the pipes from the air compressor; also hot air due to compression where there is an insufficient storage capacity to permit of the air cooling before passing to the tools, or where the water-jacket or cooling device on the compressor is inadequate. We make only one grade of tubing and hose for this purpose, called 'Peerless.' This tubing and hose is guaranteed not to flake or peel off and get into the delicate valves and

port openings in the tools, thus avoiding a great deal of trouble and delay to the operator."

Cole & Kuhls, Twenty-third street and Third avenue, Brooklyn, N. Y., manufacturers of elastic seam composition for decks, weather checks, etc. (all places where a perfectly tight joint is wanted), announce the following list of agents: Cook & Co., Tacoma, Wash.; Jennison Hardware Co., Bay City, Mich.; J. F. Donahue, Sandusky, O.; The Chas. F. Beebe Co., Portland, Ore.; James E. Hurley, long dock, Erie Basin, Brooklyn, N. Y.; the Marine Manufacturing & Supply Co., 158 South street, New York; James Reilly Repair & Supply Co., 229-230 West street, New York; Anthony S. Morss, 210-212 Commercial street, Boston; Geo. B. Carpenter & Co., 202-208 S. Water street, Chicago; Elisha Webb & Son, 108 South Delaware avenue, Philadelphia.

Capt. F. W. Symonds, inspector of the ninth light-house district, gives notice that applications on proper forms will be received for thirty days next at his office, room 1431 Marquette building, Chicago, for the purpose of forming an eligible list from which to fill vacancies for master, mate, engineer and assistant engineer of vessels in the light-house service for one year from date of examination. Persons wishing to apply for examination can obtain blank forms from the Chicago office. It is not necessary to appear in person. All applications received will be examined, the applicants graded according to merit and a list of those eligible for appointment sent to the United States light-house board.

U. S. Engineer Office, Duluth, Minn., April 5, 1901. Sealed proposals will be received here until noon, April 20, 1901, and then publicly opened, for furnishing and placing rip-rap at Duluth ship canal. Information on application. D. D. Gaillard, Capt., Engrs. Apr. 18.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., April 10, 1901. Sealed proposals for Dredging at Harbors on East Shore of Lake Michigan will be received here until 3 P. M., April 25, 1901, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Apr. 18.

U. S. Engineer Office, Customhouse, Cincinnati, O., March 22, 1901. Sealed proposals for hire of Towboat having cylinders about 14 inches diameter, with 5 feet stroke, to serve as tender for Ohio River Dredges during present season, will be received here until 2 p. m., April 26, 1901, and then publicly opened. Information furnished on application. Wm. H. Bixby, Maj., Engrs. Apr. 18.

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## SHIPOWNING IN DENMARK IN 1901.

According to the "Official List of Danish War and Merchant Vessels," just published, the merchant navy of Denmark consisted, on Jan. 1, 1901, of 3,274 sailing ships, measuring altogether 176,000 tons gross, and 542 steamers of 417,200 tons gross, being a total of 3,816 vessels and 593,200 tons gross measurement. In these figures are included all Danish, Icelandic and Danish-West Indian vessels of five tons and upwards—dredgers, lighters, barges, etc., being excluded. The Icelandic fleet comprises ninety-nine sailers of (altogether) about 4,000 tons gross, and thirty-two steamers of about 4,900 tons gross; the Farøe islands are the home of ninety-three sailers (about 7,000 tons gross) and two steamers (480 tons gross); while to the West Indies are attached fifty-one sailing ships (518 tons gross). In Denmark itself 3,124 sailing vessels of about 171,500 tons and 513 steamers of 416,805 tons gross were owned on Jan. 1 last. Among the sailers are six "veterans" which are more than a hundred years old—one was built in 1776, one in 1786, one in 1794, one in 1796 and one in 1799. Most of the sailers are built of wood, only twenty-five of them being of steel and thirty-six of iron. The largest iron ship is the barque Sixtus of Fanø, 1,817 tons gross. The largest sailing ship owneries are Messrs. C. P. Holm and Messrs. P. N. Winther, both of which firms are located at Nordby (Fanø), the first possessing seven ships (7,929 tons) and the other ten ships (7,535 tons). The other firms owning more than 3,000 tons of sailing tonnage are N. Petersen of Marstal, twenty-two ships (4,474 tons), H. C. Christensen of Marstal, twenty ships (3,994 tons), and J. F. Dessauer of Copenhagen, three ships (3,587 tons).

Of the 513 steamers owned in Denmark proper 150 of them (2,060 tons altogether) are under 100 tons register, so that only 363 of them (414,745 tons altogether) measure more than 100 tons. Of these 363 steamers, 339 are owned at Copenhagen (about 361,000 tons), eleven at Esbjerg (12,173 tons), three at Elsinore (4,193 tons), five at Aalborg (3,913 tons), etc. The largest steamship owner is the United Steamship Co. of Copenhagen, with 124 vessels, measuring altogether 124,860 tons gross. Then follow three companies owning more than 20,000 tons each,

namely, the Norden with eleven vessels (29,555 tons), the Dannebrog with eleven vessels (22,100 tons), and the Kjöbenhavn with nine vessels (21,741 tons gross). Further, there are three companies possessing upwards of 10,000 tons, these being the Dampskibs-Selskab of 1896 with eight steamers (15,334 tons), the Dansk-Russiske-Dampskibs-Selskab with seven (13,550 tons) and the Urania with seven (12,985 tons). The Danish state railways board is also to be reckoned with the owneries disposing of between 10,000 and 20,000 tons of steam shipping. There are thirteen owneries possessing from 5,000 up to 10,000 tons. As regards the size of the steamers, it may be mentioned that there is only one of more than 5,000 tons measurement, namely the Anam, belonging to the East Asiatic Co. and measuring 5,709 tons. Then follow the Alabama (4,454 tons), the Texas (4,446 tons), and the Florida (4,335 tons)—all three belonging to the United Steamship Co.—and the Canadia (4,323 tons), belonging to the Kjöbenhavn company. There are also seventeen steamers of between 3,000 and 4,000 tons gross measurement.

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## BURNISHINE.

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In Liquid and  
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Metal,

no matter which.

Produces a wonderfully brilliant  
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# BELLEVILLE GENERATORS

Grand Prix 1889

Originated 1849

Hors Concours 1900

Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville  
Generators—Since their Adoption in the Service.

Year.	Australian	Polynesian	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.

WORKS AND YARDS OF L'ERMITAGE ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.



## BUSINESS MATTERS.

Edward N. Hawley, president of the Standard Pneumatic Tool Co., Marquette building, Chicago, returned last Tuesday from a month's trip on the Pacific coast in the interest of his company.

Lewis & Crane, Seattle, Wash., have just issued a picture of the launch at Seattle of a four-masted barkentine that is built throughout from masthead to keel of Douglas fir, which is also called Oregon pine. A sister vessel, launched a few months ago, was purchased by the United States government. Lewis & Crane are extensive dealers in ship building material—planking, decking, cabin material and spars, including long and heavy timbers. "Upon receipt of inquiry," they say, "we will name the lowest cash price delivered to any railroad station in North America."

A large engineering plant will shortly be erected in Cleveland by the Wellman-Seaver Engineering Co. The new works will be on the line of the Cleveland & Pittsburg Railroad, between Central avenue and Quincy street, and will comprise a machine shop 750 by 128 ft., a blacksmith shop about 100 by 100 ft., pattern making and storage shop, boiler and power house, and later on a steel and iron foundry of about 700 by 100 ft. The success of the Wellman-Seaver company of late has been wonderful. Contracts closed recently include a large amount of work for Spain, England and Japan.

The B. F. Sturtevant Co. of Boston, Mass., recently received the following unsolicited letter from the Widdicomb Furniture Co., Grand Rapids, Mich.: "Enclosed we hand you check for exhaust head, which was applied yesterday and found to be the most efficient device for the purpose the writer has ever seen. The condition of the atmosphere this morning is one of extreme moisture, which certainly would display any spray passing out with the steam, but not a particle of moisture can be found in the air, and that even within 12 in. from the exhaust steam. As we have to purchase our water supply the device will soon pay for itself."

Hall Bros., engineers of Philadelphia (offices in the Bourse), are

making a marine gasoline engine that has met with special favor from owners of launches and other pleasure craft. About thirty of the engines have been sold since the first of the year to some of the best known people in Philadelphia. A circular devoted to the engine of launch size shows improvements over most engines of this kind and gives assurance of the best material and workmanship. The engine can be placed well aft in the stern of a launch. Improvements to which special attention is directed include a patent igniter, which is operated by one spring only, and a vaporizer valve, which governs the supply of gasoline automatically and has its working parts exposed. The designers claim that it is absolutely impossible to explode the engine.

## LARGE FLOATING DRY DOCK.

A large floating dry dock under construction at the works of Moran Bros. Co., Seattle, Wash., will be completed in about sixty days. This company already has in operation a marine railway of 150 ft. length of cradle, 41 ft. width of cradle and 1,250 tons capacity. Dimensions of the new floating dock are: Extreme length, 200 ft.; length on blocks, 190 ft.; width between towers, 55 ft. 1 in.; capacity, 2,500 tons. This is the first half of a floating dock of 400 ft. length that will eventually be built. Pumping and draining machinery will be operated by electricity and all appliances will be of the latest design for their respective purposes. The floating dock will be operated in connection with the company's ship building and repair plant and will be located on the deep water front adjoining the ship yard property.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

## The effect of Electrolysis

**Brass Tubes**,—taken from a condenser, and replaced with tubes of Benedict-Nickel!



A Booklet on "Benedict-Nickel," with a treatise on "Electrolysis of Condenser Tubes," will be mailed upon request.

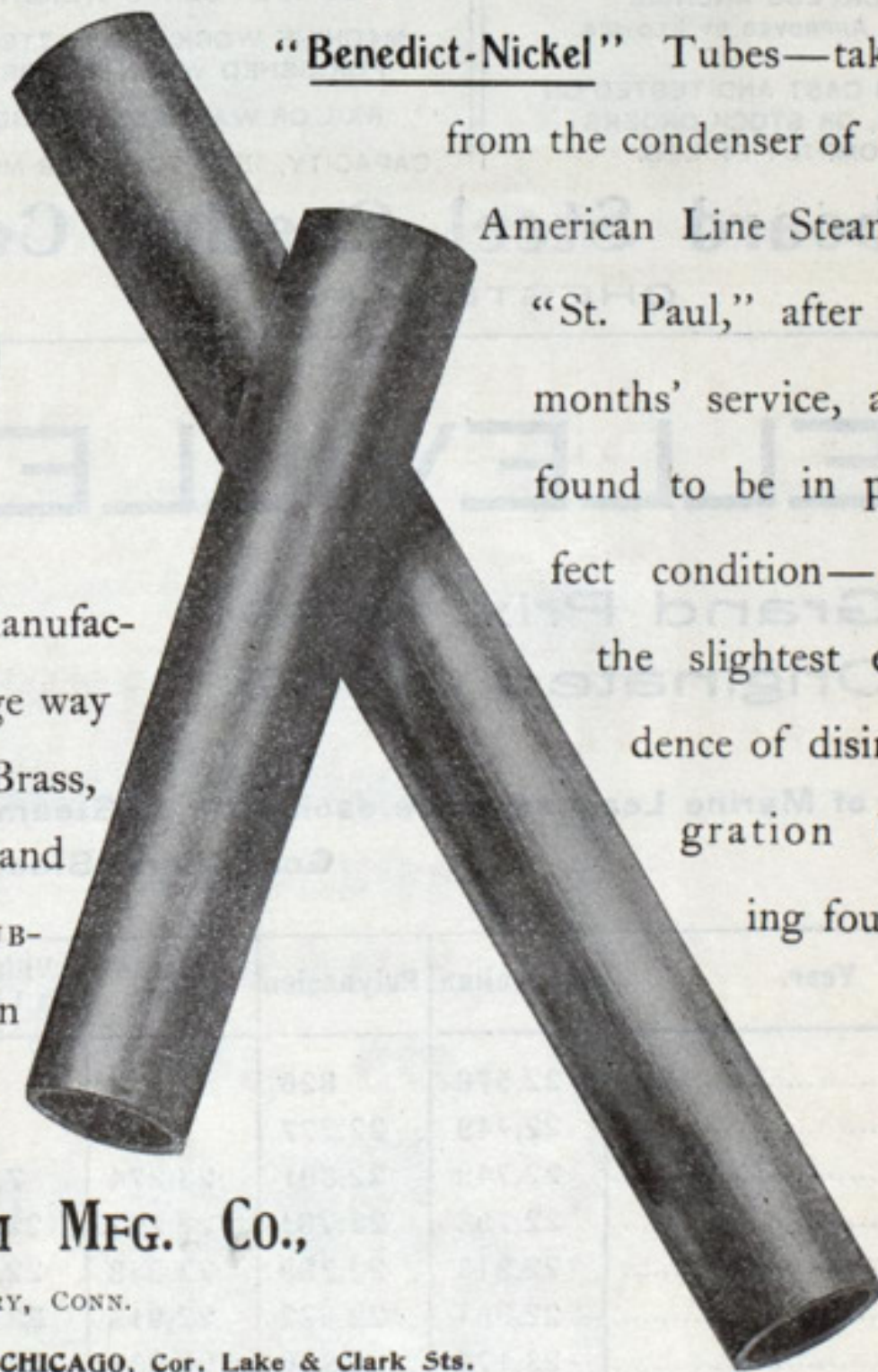
We are also manufacturers in a large way of Seamless Brass, Copper and Bronze TUBING; Brass and Copper in SHEETS, RODS and WIRE.

**BENEDICT & BURNHAM MFG. CO.,**

Mills and Offices, WATERBURY, CONN.

NEW YORK, 253 B'way—BOSTON, 172 High St—CHICAGO, Cor. Lake & Clark Sts.

**"Benedict-Nickel" Tubes**—taken from the condenser of the American Line Steamer "St. Paul," after 28 months' service, and found to be in perfect condition—not the slightest evidence of disintegration being found.



## LUMBER SCHOONER FOR SALE.

A first-class lumber schooner of 275,000 ft. capacity cheap for cash. Address Wm. E. Barrett & Co., Grand Rapids, Mich. May 9.

## FOR SALE OR CHARTER.

First-class British steamers, of Welland canal dimensions; about 3,250 gross tons capacity, carrying about 2,000 gross tons on 14 ft. (fresh water) draught. Speed 10 knots loaded; easy consumption. Large hatchways. For further particulars address "Charter," The Marine Review Pub. Co., Perry-Payne Bldg., Cleveland, Ohio. May 2.

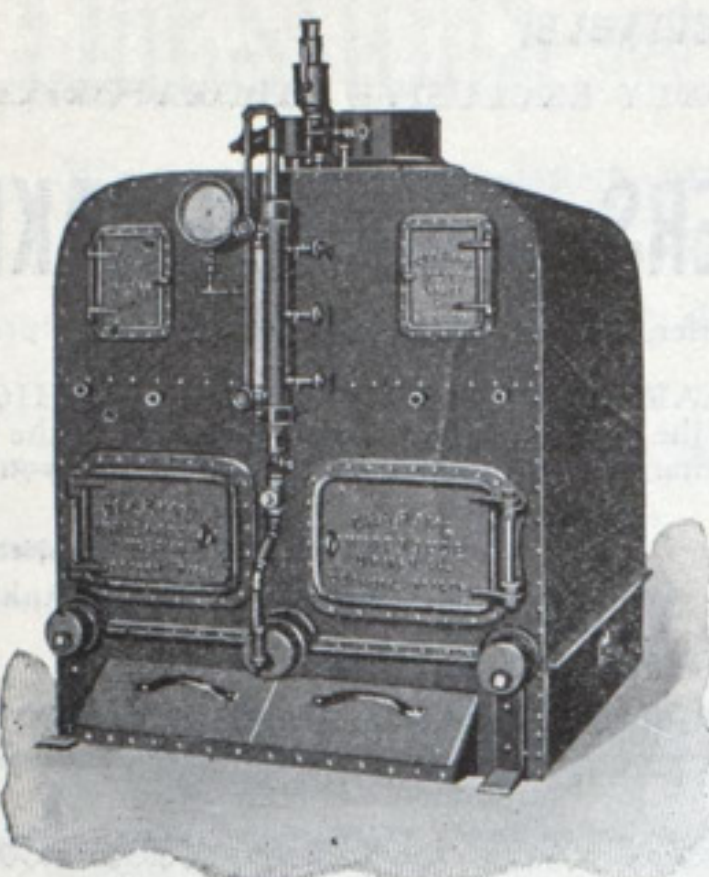
## Five Electric Passenger Launches For Sale.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf

## SIDE-WHEEL TUG FOR SALE.

Length 66 ft., depth 5 ft. Boilers new. Machinery in good state of repair. For further particulars address The I. Stephenson Co., Wells, Delta County, Mich. April 25.



**FUEL ECONOMY.**

October 31, 1899.

Dearing Water Tube Boiler Co., Detroit, Mich.

Gentlemen:—The boiler we purchased of you about three years ago has been in service now three seasons, and has given entire satisfaction. It is an easy steamer and very economical in fuel, and we can cheerfully recommend it to any one wishing a boiler.

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The heating surface is so proportioned as to be at right angles to the heat rising from the grates.

The heat is evenly distributed direct through the generating tubes, thus ensuring great fuel economy and a quick generation of steam.

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is the most compact, most simple, most economical marine boiler made.

Our catalog gives full particulars. Write for it.

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Compressed Air and  
High Steam Pressures.

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To prevent pitting, neutralize the oil, stop incrustation, and as a perfect preservative to the iron, boiler, and all its connections—especially prepared for the marine trade of the lakes.

If you are using a different water, prepay the express on a gallon jug of your feed water to the DEARBORN LABORATORIES at CHICAGO and receive a copy of analysis of same, with a written diagnosis of your case, and a letter giving you all the valuable information we can, and the actual cost of what it will require to clean your boilers and keep them clean. All of this will be done free of charge, and optional with you whether you order or not. When in Chicago call and inspect our Laboratories.

**Analizers of Everything.**

**Makers of Boiler Compounds.**

**DEARBORN DRUG & CHEMICAL WORKS**  
CHICAGO

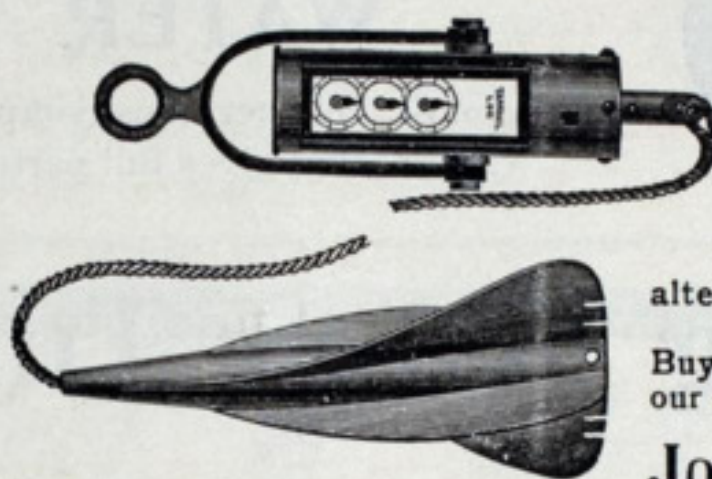
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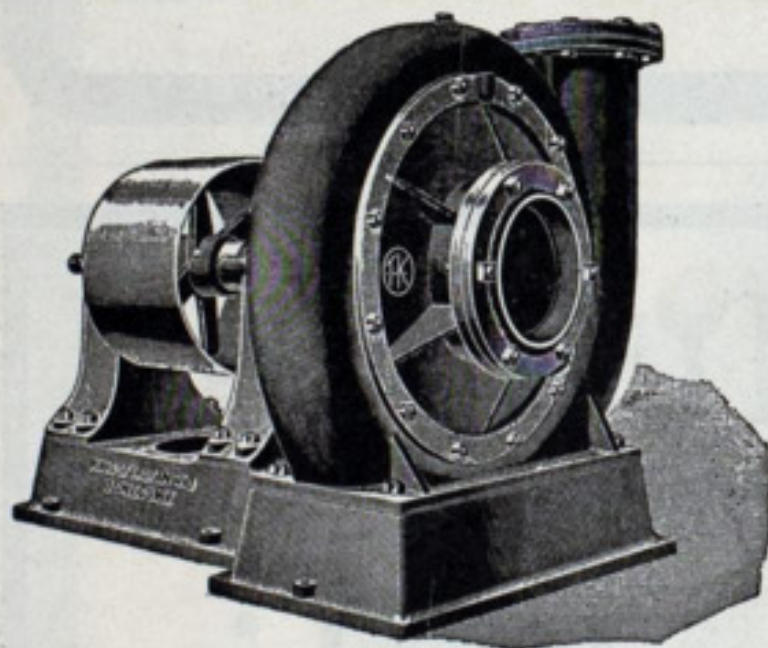
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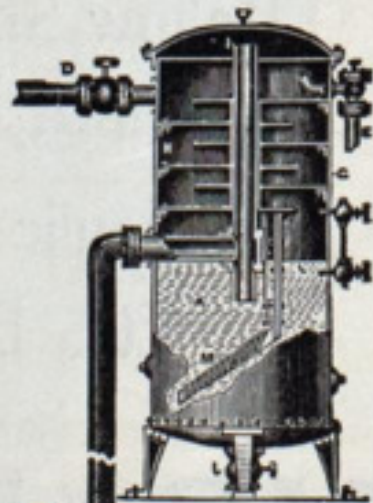
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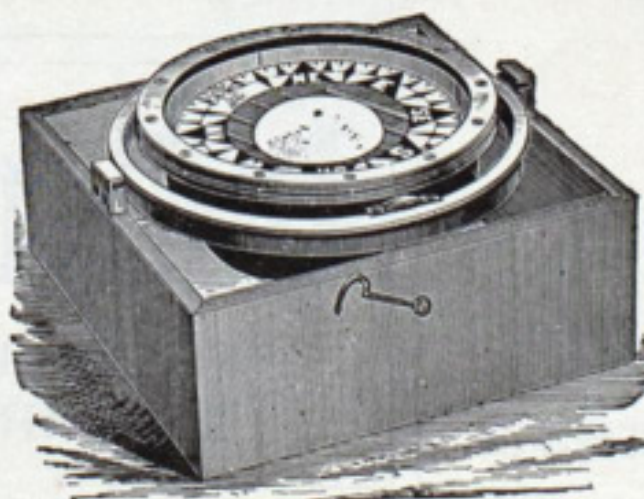
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 Q. What style of packing do they make?  
 A. They make all styles.  
 Q. Which is the best for high pressure?  
 A. Their Asbesto-Metallic.  
 Q. Why is this the best?  
 A. Because it does not scratch, gum or corrode the rod, and will not burn out.



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BOX  
LOOKS  
LIKE  
THIS.

- Q. What of its material?  
 A. It is made of the best material money can buy.  
 Q. Is it imitated much?  
 A. Nearly every packing house imitates it or the name.  
 Q. Are the imitations as good as the genuine?  
 A. No; if they were they would trade on their own reputation and not on ours.  
 Q. How can I find out more about this packing?  
 A. Ask your dealer or write direct to

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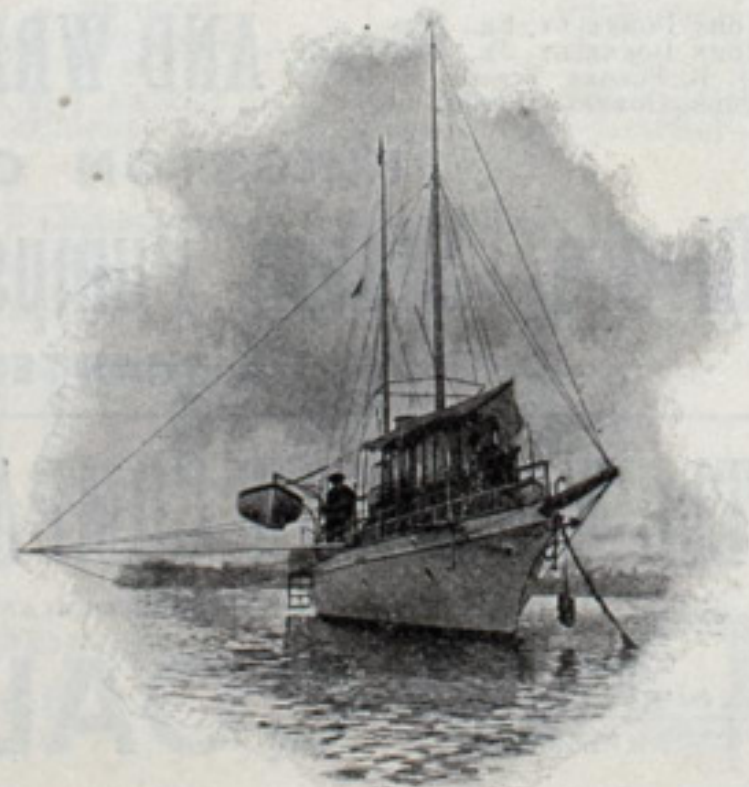
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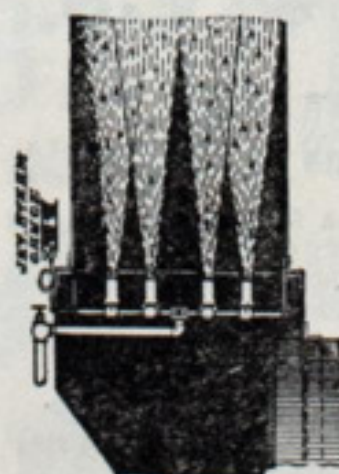
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15 to 25% increase in power.

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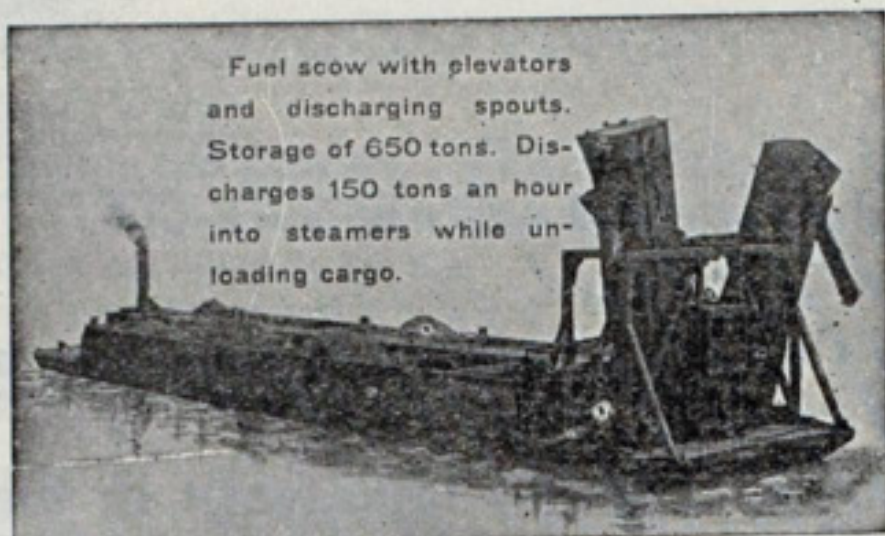


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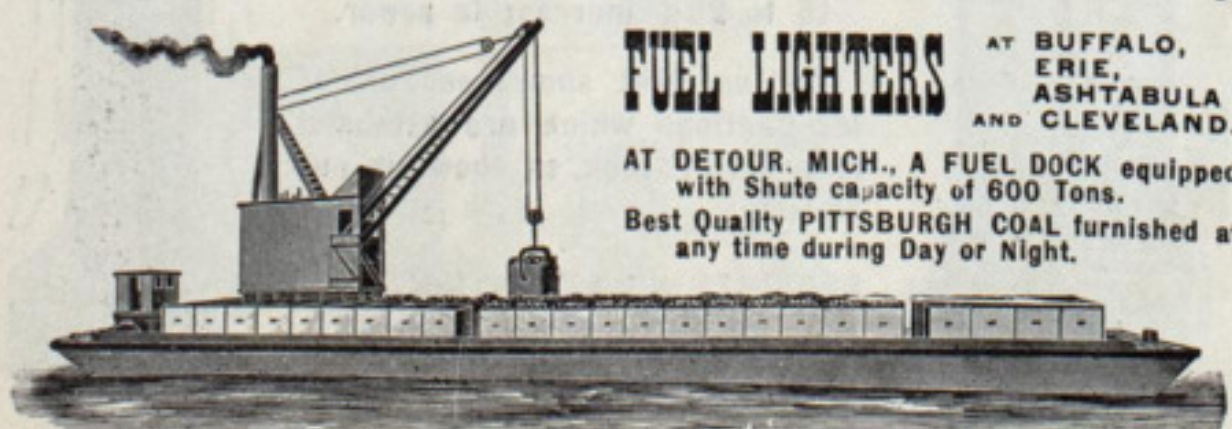
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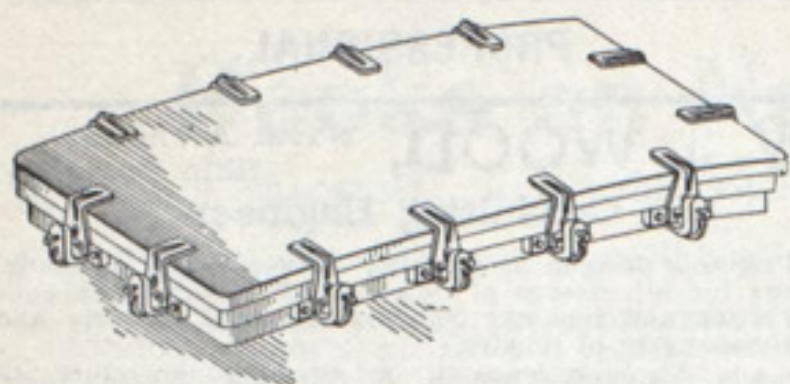
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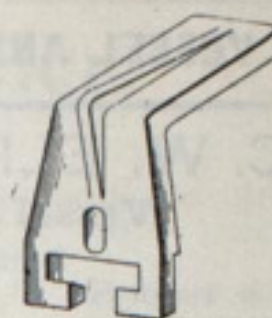
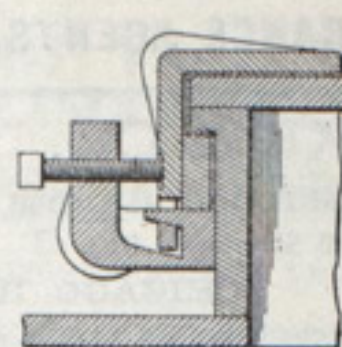
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For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 418-419 Perry-Payne Bldg., Cleveland.  
See accompanying Index of Advertisers for full addresses of concerns in this directory.

### AIR COMPRESSORS, AIR HOISTS, ETC.

"Long Arm" System Co.....Cleveland.

### ANCHORS.

Baldt Anchor Co.....Chester, Pa.  
International Anchor Co.....Cleveland.  
Seaboard Steel Casting Co.....Chester, Pa.

### ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.  
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

### ARTIFICIAL DRAFT FOR BOILERS.

American Blower Co.....Detroit.  
American Ship Building Co.....Cleveland.  
Bloombsburg & Co., H.....Newport News, Va.  
Boston Blower Co.....Hyde Park, Mass.  
Buffalo Forge Co.....Buffalo.  
Detroit Shipbuilding Co.....Detroit.  
Sturtevant, B. F. Co.....Boston.

### ATTORNEYS AND PROCTORS IN ADMIRALTY.

Crowl, Samuel H.....Cleveland.  
Gilchrist, Albert J.....Cleveland.  
Goulder, Holding & Masten.....Cleveland.  
Hoyt, Dustin & Kelley.....Cleveland.  
MacDonald, Ray G.....Chicago.  
Pinney, Orestes C.....Cleveland.  
Stowe & Graydon.....Chicago.  
White, Johnson, McCaslin & Cannon.....Cleveland.

### BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.  
Goerz, C. P.....New York.  
Ritchie, E. S. & Sons.....Brookline, Mass.

### BENDING AND STRAIGHTENING ROLLS.

Cleveland Punch & Shear Works Co.....Cleveland.  
New Doty Mfg. Co.....Janesville, Wis.  
Niles Tool Works Co.....Hamilton, O.

### BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.  
Cleveland Block Co.....Cleveland.  
Coleman & Sons, Walter.....Providence, R. I.

### BLOWERS.

American Blower Co.....Detroit.  
Boston Blower Co.....Hyde Park, Mass.  
Buffalo Forge Co.....Buffalo.  
Sturtevant, B. F. Co.....Boston.

### BOAT NAILS AND SPIKES.

American Steel & Wire Co.....Chicago.

### BOAT BUILDERS.

Dreln, Thos. & Son.....Wilmington, Del.  
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.  
Kahnweiler's Sons, David.....New York.  
Lane & DeGroot.....Brooklyn.  
Willard, Chas. P. & Co.....Chicago.

### BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.  
American Ship Building Co.....Cleveland.  
Atlantic Works.....East Boston, Mass.  
Babcock & Wilcox Co.....New York.  
Bath Iron Works, Ltd.....Bath, Me.  
Boyer Water Tube Boiler Co.....New York.  
Chicago Ship Building Co.....Chicago.  
Cramp, Wm. & Sons.....Philadelphia.  
Deering Water Tube Boiler Co.....Detroit.  
Delaunay, Belleville & Co.....St. Denis, France.  
Detroit Screw Works.....Detroit.  
Detroit Shipbuilding Co.....Detroit.  
Farrar & Trefts.....Buffalo.  
Fletcher, W. & A. Co.....Hoboken, N. J.  
Fore River Ship & Engine Co.....Weymouth, Mass.  
Gas Engine & Power Co.....Morris Heights, N. Y.  
Hardy, John B.....Tacoma, Wash.  
Harlan & Hollingsworth Co.....Wilmington, Del.  
Hodge, S. F. & Co.....Detroit.  
Jenks Ship Building Co.....Port Huron, Mich.  
Kingsford Foundry & Machine Works.....Oswego, N. Y.  
MacKinnon Mfg. Co.....Bay City, Mich.  
Maryland Steel Co.....Sparrow's Point, Md.  
Moran Bros. Co.....Seattle, Wash.  
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
Newport News Ship Building Co.....Newport News, Va.  
Nixon, Lewis.....Elizabeth, N. J.  
Pusey & Jones Co.....Wilmington, Del.  
Risdon Iron Works.....San Francisco.  
Roberts Safety Water Tube Boiler Co.....New York.  
Stirling, The Co.....Chicago.  
Trigg, Wm. R. Co.....Richmond, Va.  
Union Iron Works.....San Francisco.  
Willard, Chas. P. & Co.....Chicago.

### BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

### BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works.....New York.

### BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.  
Champion Rivet Co.....Cleveland.

### BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

### BOLT CUTTERS.

Niles Tool Works Co.....Hamilton, O.

### BORING AND TURNING MILLS.

Niles Tool Works Co.....Hamilton, O.

### BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons.....Philadelphia.  
Illinois Smelting & Refining Works.....Chicago.  
Phosphor Bronze Smelting Co.....Philadelphia.

### BRIDGES, BUILDERS OF.

American Bridge Co.....New York.  
Scherzer Rolling Lift Bridge Co.....Chicago.

### BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co.....Cleveland.  
McMyler Mfg. Co.....Cleveland.

### CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

### CAPSTANS.

American Ship Windlass Co.....Providence, R. I.  
Hyde Windlass Co.....Bath, Me.

### CHAINS.

Monongahela Iron & Steel Co.....Pittsburg.  
Newhall Chain Forge & Iron Co.....New York.  
Standard Chain Co.....Pittsburg.

### CHAIN HOISTS.

Boston & Lockport Block Co.....Boston, Mass.

### CHUCKING MACHINES.

Niles Tool Works Co.....Hamilton, O.

### CHUCKS FOR LATHES, DRILLS AND PLANERS.

Skinner Chuck Co.....New Britain, Conn.

### CIRCULATOR, EQUILIBRIUM, with Steam Heating Attachment.

Bloombsburg & Co., H.....Newport News, Va.

### CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co.....Boston.  
Bliss, John & Co.....New York.  
Ritchie, E. S. & Sons.....Brookline, Mass.

### COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt.....Philadelphia.  
Hanna, M. A. & Co.....Cleveland.  
Ohio Fuel Co.....Cleveland.  
Pickands, Mather & Co.....Cleveland.  
Pittsburg Coal Co.....Cleveland.  
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.  
Scott Co., The W. L.....Erie, Pa.

### COAL AND ORE HANDLING MACHINERY.

Brown Hoisting Machinery Co., Incorporated.....Cleveland.  
Lidgerwood Mfg. Co.....New York.  
McMyler Mfg. Co.....Cleveland.

### COMPASSES.

Bliss, John & Co.....New York.  
Ritchie, E. S. & Sons.....Brookline, Mass.

### CORK JACKETS AND RINGS.

Armstrong Cork Co.....Pittsburgh, Pa.  
Kahnweiler's Sons, D.....New York.  
Lane & DeGroot.....Brooklyn.

### CORRESPONDENCE SCHOOLS—ENGINEERING AND NAVIGATION.

Chicago Nautical School.....Chicago.

### CRANES, CONVEYORS, HOISTS.

Brown Hoisting Machinery Co., Incorporated.....Cleveland.  
General Electric Co.....Schenectady, N. Y.  
Lidgerwood Mfg. Co.....New York.  
McMyler Mfg. Co.....Cleveland.  
Westinghouse Electric & Mfg. Co.....Pittsburg.

### CRANK PINS.

Cleveland City Forge & Iron Co.....Cleveland.

### DIVING APPARATUS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

### DOORS—PNEUMATIC AND ELECTRIC SAFETY POWER DOORS AND HATCHES.

"Long Arm" System Co.....Cleveland.

### DRILL PRESSES—DRILLS OF ALL KINDS.

Cleveland Punch & Shear Works Co.....Cleveland.  
Niles Tool Works Co.....Hamilton, O.

### DRYING APPARATUS.

American Blower Co.....Detroit.  
Boston Blower Co.....Hyde Park, Mass.  
Sturtevant, B. F. Co.....Boston.

### DRILLS, PNEUMATIC.

Standard Pneumatic Tool Co.....Chicago.

### DRY DOCKS.

American Ship Building Co.....Cleveland.  
Bath Iron Works, Ltd.....Bath, Me.  
Buffalo Dry Dock Co.....Buffalo.  
Chicago Ship Building Co.....Chicago.  
Craig Ship Building Co.....Toledo, O.  
Cramp, Wm. & Sons.....Philadelphia.  
Detroit Shipbuilding Co.....Detroit.

Harlan & Hollingsworth Co.....Wilmington, Del.  
Lockwood Mfg. Co.....East Boston, Mass.  
Maryland Steel Co.....Sparrow's Point, Md.  
Moran Bros. Co.....Seattle, Wash.  
Newport News Ship Building Co.....Newport News, Va.  
Nixon, Lewis.....Elizabeth, N. J.  
Pusey & Jones Co.....Wilmington, Del.  
Townsend & Downey Ship Bldg. Co.....New York.  
Union Iron Works.....San Francisco.

### ELECTRIC AUTOMATIC WHISTLE OPERATORS.

Signal & Control Co.....New York.

### ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co.....Buffalo.  
Bullock Electric Mfg. Co.....Cincinnati.  
Electro-Dynamic Co.....Philadelphia.  
Elwell-Parker Electric Co.....Cleveland.  
General Electric Co.....Schenectady, N. Y.  
Seidler-Miner Electric Co.....Detroit.  
Sturtevant, B. F. Co.....Boston.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

### ELECTRIC HOISTS AND CRANES.

Bullock Electric Mfg. Co.....Cincinnati.  
Elwell-Parker Electric Co.....Cleveland.  
General Electric Co.....Schenectady, N. Y.  
Lidgerwood Mfg. Co.....New York.  
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

### ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co.....Philadelphia.

### ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.  
Atlantic Works.....East Boston, Mass.  
Bath Iron Works, Ltd.....Bath, Me.  
Chicago Ship Building Co.....Chicago.  
Chase Machine Co.....Cleveland.  
Craig Ship Building Co.....Toledo, O.  
Cramp, Wm. & Sons.....Philadelphia.  
Detroit Shipbuilding Co.....Detroit.  
Farrar & Trefts.....Buffalo.  
Fletcher, W. & A. Co.....Hoboken, N. J.  
Fore River Ship & Engine Co.....Weymouth, Mass.  
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.  
Hardy, John B.....Tacoma, Wash.  
Harlan & Hollingsworth Co.....Wilmington, Del.  
Hodge, S. F. & Co.....Detroit.  
Jenks Ship Building Co.....Port Huron, Mich.  
Lake Shore Engine Works.....Marquette, Mich.  
Lockwood Mfg. Co.....East Boston, Mass.  
MacKinnon Mfg. Co.....Bay City, Mich.  
Maryland Steel Co.....Sparrow's Point, Md.  
Moran Bros. Co.....Seattle, Wash.  
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
Newport News Ship Building Co.....Newport News, Va.  
Nixon, Lewis.....Elizabeth, N. J.  
Olds Motor Works.....Detroit.  
Pusey & Jones Co.....Wilmington, Del.  
Risdon Iron Works.....San Francisco.  
Roach's Ship Yard.....Chester, Pa.  
Sheriffs Mfg. Co.....Milwaukee.  
Trigg, Wm. R. Co.....Richmond, Va.  
Trout, H. G.....Buffalo.  
Union Iron Works.....San Francisco.  
Willard, Chas. P. & Co.....Chicago.

### ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.  
Electro-Dynamic Co.....Philadelphia.  
Seidler-Miner Electric Co.....Detroit.

### ENGINEERING SPECIALTIES AND SUPPLIES.

Crane & Co.....Chicago.  
Reilly Repair & Supply Co., James.....New York.

### ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co.....Philadelphia.  
Hunt, Robt. W. & Co.....Chicago.  
Miller, Walter.....Cleveland.  
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.  
Powell, Ambrose V.....Chicago.  
See, Horace.....New York.  
Wood, W. J.....Chicago.

### EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James.....New York.

### FANS FOR VENTILATION, EXHAUST, ETC.

American Blower Co.....Detroit.  
Boston Blower Co.....Hyde Park, Mass.  
Buffalo Forge Co.....Buffalo.  
Sturtevant, B. F. Co.....Boston.

### FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert.....Buffalo.  
Reilly Repair & Supply Co., James.....New York.  
Reynolds, H. J.....Cleveland.  
Warren Webster & Co.....Camden, N. J.

### FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co.....Boston.  
Porter's Sons' Co., Wm.....New York.

### FORGES.

Buffalo Forge Co.....Buffalo.  
Sturtevant, B. F. Co.....Boston.

### FORGINGS.

Bourne-Fuller Co.....Cleveland.  
Cleveland City Forge & Iron Co.....Cleveland.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## FURNACES FOR BOILERS.

Continental Iron Works.....New York.

## FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas)....Philadelphia.  
 Hanna, M. A. & Co.....Cleveland.  
 Ohio Fuel Co.....Cleveland.  
 Pickands, Mather & Co.....Cleveland.  
 Pittsburgh Coal Co.....Cleveland.  
 Rochester & Pittsburgh Coal & Iron Co.....Buffalo.  
 Scott Co., The W. L.....Erie, Pa.  
 Smith, Stanley B. & Co.....Detroit.  
 Youghiogheny & Lehigh Coal Co.....Chicago.

## GAS BUOYS.

Safety Car Heating &amp; Lighting Co.....New York.

## GAS AND GASOLINE ENGINES.

Lake Shore Engine Works.....Marquette, Mich.  
 McMyler Mfg. Co.....Cleveland.  
 Olds Motor Works.....Detroit.

## GAGES, STEAM AND VACUUM.

American Steam Gauge Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crosby Steam Gauge & Valve Co.....Boston.

## GRAPHITE.

Dixon Crucible Co., Joseph.....Jersey City, N. J.

## HAMMERS, PNEUMATIC.

Standard Pneumatic Tool Co.....Chicago.

## HAMMERS, POWER DROP.

Chase Machine Co.....Cleveland.  
 Niles Tool Works Co.....Hamilton, O.

## HATCH FASTENERS.

Mulholland, M.....Cleveland.

## HATCH GEARS.

"Long Arm" System Co.....Cleveland.

## HAWSERS, WIRE.

American Steel &amp; Wire Co.....Chicago.

## HEATING APPARATUS.

Sturtevant, B. F. Co.....Boston.

## HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.  
 Brown Hoisting Machinery Co., Incorporated.....Cleveland.  
 Chase Machine Co.....Cleveland.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....New York.  
 Hodge, S. F. & Co.....Detroit.  
 Hyde Windlass Co.....Bath, Me.  
 Lidgerwood Mfg. Co.....New York.  
 McMyler Mfg. Co.....Cleveland.  
 Marine Iron Co.....Bay City.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## HOSE FOR PNEUMATIC TOOLS.

Sayen &amp; Schultz.....Philadelphia.

## INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crosby Steam Gauge & Valve Co.....Boston.

## IGNITERS FOR GAS ENGINES.

Holtzer-Cabot Electric Co.....Brookline, Mass.

## INJECTORS.

Crane Co.....Chicago.  
 Jenkins Bros.....New York.

## INSURANCE, MARINE.

Brown & Co.....Buffalo.  
 Drake & Maytham.....Buffalo.  
 Elphicke, C. W. & Co.....Chicago.  
 Hawgood & Moore.....Cleveland.  
 Helm, D. T. & Co.....Duluth, Minn.  
 Hutchinson & Co.....Cleveland.  
 Keith, J. G. & Co.....Chicago.  
 La Salle & Co.....Duluth.  
 Mitchell & Co.....Cleveland.  
 Osborn, F. H. & Co.....Chicago.  
 Pauly, H. J.....Milwaukee.  
 Parker, A. A. & W. B.....Detroit.  
 Peck, Chas. E. & W. F.....New York and Chicago.  
 Richardson, W. C.....Cleveland.  
 Sullivan, D. & Co.....Chicago.

## IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland.  
 Hanna, M. A. & Co.....Cleveland.  
 Pickands, Mather & Co.....Cleveland.

## IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

## LATHES OF ALL KINDS.

Niles Tool Works Co.....Hamilton, O.

## LAUNCHES—NAPHTHA, ELECTRIC.

Gas Engine &amp; Power Co.....New York.

## LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.

Armstrong Cork Co.....Pittsburg.  
 Drein, Thos. & Son.....Wilmington, Del.  
 Kahnweiler's Sons, D.....New York.  
 Lane & DeGroot.....Brooklyn.

## LIGHTS, SIDE AND SIGNAL.

Page Bros. & Co.....Boston.  
 Porter's Sons' Co., Wm.....New York.

## LOGS.

Walker & Son, Thomas.....Birmingham, Eng.  
 Also Ship Chandlers.

## MACHINE TOOLS.

Niles Tool Works Co.....Hamilton, O.

## MACHINE TOOLS (WOOD WORKING).

Fay & Egan Co., J. A.....Cincinnati, O.  
 Atlantic Works, Inc.....Philadelphia.

## MALLET FOR CAULKERS, BOILER MAKERS, ETC.

N. Y. Mallet &amp; Handle Works.....New York.

## MARINE RAILWAYS, BUILDERS OF

Crandall &amp; Son, H. I.....East Boston, Mass.

## MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

## MECHANICAL DRAFT FOR BOILERS.

American Blower Co.....Detroit.  
 American Ship Building Co.....Cleveland.  
 Boston Blower Co.....Hyde Park, Mass.  
 Bloomsburg & Co., H.....Newport News, Va.  
 Buffalo Forge Co.....Buffalo.  
 Detroit Shipbuilding Co.....Detroit.  
 Sturtevant, B. F. Co.....Boston.

## METALLIC PACKING.

American Steam Packing Co.....Boston.  
 Katzenstein, L. & Co.....New York.  
 U. S. Metallic Packing Co.....Philadelphia.

## METALS FOR BEARINGS.

Cramp, Wm. & Sons.....Philadelphia.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

## METAL POLISH.

Bertram's Oil Polish Co.....Boston, Mass.  
 Paul & Co., J. C.....Chicago.

## MILLING MACHINES OF ALL KINDS.

Niles Tools Works Co.....Hamilton, O.

## NAUTICAL INSTRUMENTS.

Bliss, John & Co.....New York.  
 Ritchie, E. S. & Sons.....Brookline, Mass.

## NAVAL ARCHITECTS.

See, Horace.....New York.  
 Wood, W. J.....Chicago.

## OAKUM.

Stratford Oakum Co., Geo.....Jersey City, N. J.

## OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph.....Jersey City, N. J.  
 Standard Oil Co.....Cleveland.

## OUTFITTING OF VESSELS—CARPETS, FURNITURE, ETC.

Sterling, Welch & Co.....Cleveland.  
 Williams & Rodgers Co.....Cleveland.

## PACKING.

American Steam Packing Co.....Boston, Mass.  
 Crane Co.....Chicago.  
 Garlock Packing Co.....Palmyra, N. Y.  
 Jenkins Bros.....New York.  
 Katzenstein, L. & Co.....New York.  
 Sayen & Schultz.....Philadelphia.  
 U. S. Metallic Packing Co.....Philadelphia.

## PAINTS.

Baker, Howard H. & Co.....Buffalo.  
 Smith, Edward & Co.....New York.  
 Upson-Walton Co.....Cleveland.

## PATENT ATTORNEYS.

Thurston &amp; Bates.....Cleveland.

## PATTERN SHOP MACHINERY.

Fay & Egan Co., J. A.....Cincinnati, O.  
 Atlantic Works, Inc.....Philadelphia.

## PIPE THREADING AND CUTTING MACHINES.

Merrell Mfg. Co.....Toledo, O.

## PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland.  
 Crane Co.....Chicago.

## PLANERS OF ALL KINDS.

Niles Tool Works Co.....Hamilton, O.

## PLANING MILL MACHINERY.

Fay & Egan Co., J. A.....Cincinnati, O.  
 Atlantic Works, Inc.....Philadelphia.

## PLUMBING, MARINE.

Ellis Marine Plumbing Co.....New York.  
 Mott Iron Works, J. L.....New York.  
 Reilly Repair & Supply Co., James.....New York.  
 Sands, Alfred B. & Son.....New York.

## PNEUMATIC TOOLS.

Standard Pneumatic Tool Co.....Chicago.

## POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.  
 Paul & Co., J. C.....Chicago.

## PROPELLER WHEELS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Detroit Shipbuilding Co.....Detroit.  
 Farrar & Trefts.....Buffalo.  
 Fore River Ship & Engine Co.....Weymouth, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Hyde Windlass Co.....Bath, Me.  
 Harlan & Hollingsworth Co.....Wilmington, Del.  
 Hodge, S. F. & Co.....Detroit.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 MacKinnon Mfg. Co.....Bay City, Mich.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.  
 Pusey & Jones Co.....Wilmington, Del.

Risdon Iron Works.....San Francisco.  
 Sheriffs Mfg. Co.....Milwaukee.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Trout, H. G.....Buffalo.  
 Union Iron Works.....San Francisco.

## PROJECTORS, ELECTRIC.

Bullock Electric Mfg. Co.....Cincinnati.  
 Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.....New York.  
 Kingsford Foundry & Machine Works.....Oswego, N. Y.  
 Wood, R. D. & Co.....Philadelphia.  
 Worthington, Henry R.....New York.

## PUNCHES, RIVETERS, SHEARS.

Cleveland Punch & Shear Works Co.....Cleveland.  
 New Doty Mfg. Co.....Janesville, Wis.  
 Niles Tool Works Co.....Hamilton, O.  
 Wood, R. D. & Co.....Philadelphia.

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.....New York.

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland.  
 Champion Rivet Co.....Cleveland.

## RIGGING ROPE (WIRE).

American Steel &amp; Wire Co.....Chicago.

## RUBBER GOODS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

## RUBBER INSULATED WIRES.

Roebling's Sons, John A.....New York and Cleveland.  
 American Steel & Wire Co.....Chicago.

## SAFETY VALVES.

American Steam Gauge Co.....Boston.  
 Ashton Valve Co.....Boston.  
 Crosby Steam Gauge & Valve Co.....Boston.

## SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.  
 Upson-Walton Co.....Cleveland.  
 Wilson & Silsby.....Boston.

## SALVAGE COMPANIES.

See wrecking companies.

## SCHOOLS, CORRESPONDENCE—ENGINEERING AND NAVIGATION.

Chicago Nautical School.....Chicago.

## SEAM COMPOSITION AND ELASTIC SEAM PAINT.

Cole &amp; Kuhls.....Brooklyn.

## SEARCH LIGHTS.

Elwell-Parker Electric Co.....Cleveland.  
 General Electric Co.....Schenectady, N. Y.  
 Rushmore Dynamo Works.....Jersey City, N. J.  
 Seidler-Miner Electric Co.....Detroit.  
 Westinghouse Electric & Mfg. Co.....Pittsburg.

## SHAPERS.

Niles Tool Works Co.....Hamilton, O.

## SHEARS.

See punches, riveters and shears.

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland.

## SHIP BUILDERS.

American Ship Building Co.....Cleveland.  
 Atlantic Works.....East Boston, Mass.  
 Bath Iron Works, Ltd.....Bath, Me.  
 Buffalo Dry Dock Co.....Buffalo.  
 Cramp, Wm. & Sons.....Philadelphia.  
 Craig Ship Building Co.....Toledo, O.  
 Chicago Ship Building Co.....Chicago.  
 Detroit Shipbuilding Co.....Detroit.  
 Fore River Ship & Engine Co.....Weymouth, Mass.  
 Hardy, John B.....Tacoma, Wash.  
 Harlan & Hollingsworth Co.....Wilmington, Del.  
 Jenks Ship Building Co.....Port Huron, Mich.  
 Lockwood Mfg. Co.....East Boston, Mass.  
 Maryland Steel Co.....Sparrow's Point, Md.  
 Moran Bros. Co.....Seattle, Wash.  
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.  
 Newport News Ship Building Co.....Newport News, Va.  
 Nixon, Lewis.....Elizabeth, N. J.  
 Pusey & Jones Co.....Wilmington, Del.  
 Risdon Iron Works.....San Francisco.  
 Roach's Ship Yard.....Chester, Pa.  
 Townsend & Downey Ship Bldg. Co.....New York.  
 Trigg, Wm. R. Co.....Richmond, Va.  
 Union Iron Works.....San Francisco.  
 Willard, Chas. P. & Co.....Chicago.

## SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.  
 Moran Bros. Co.....Seattle, Wash.  
 Reilly Repair & Supply Co., James.....New York.  
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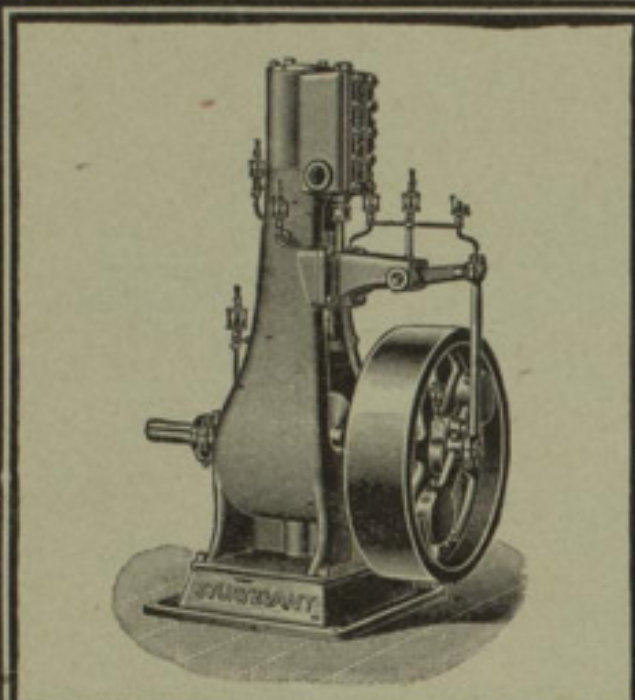
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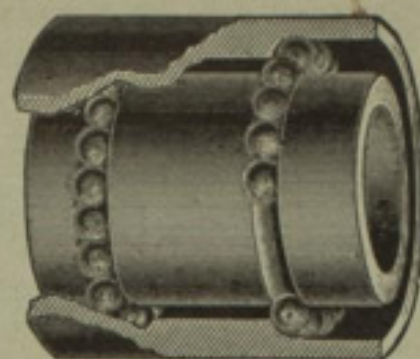
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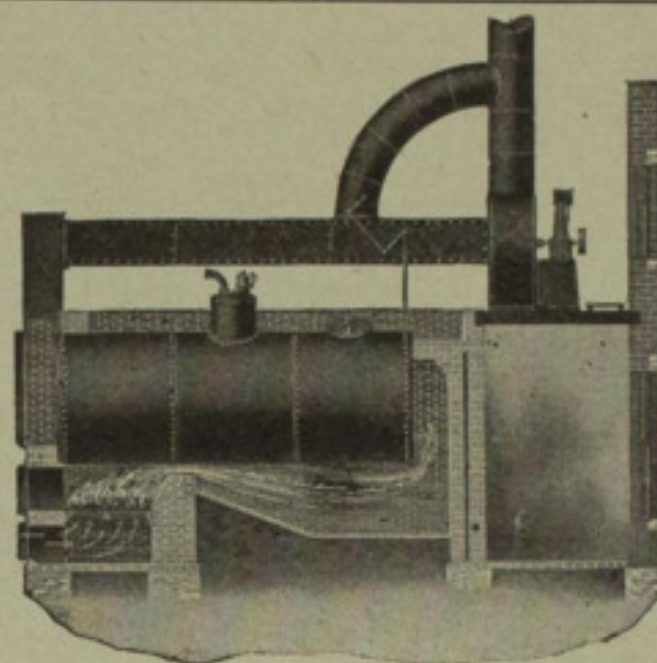
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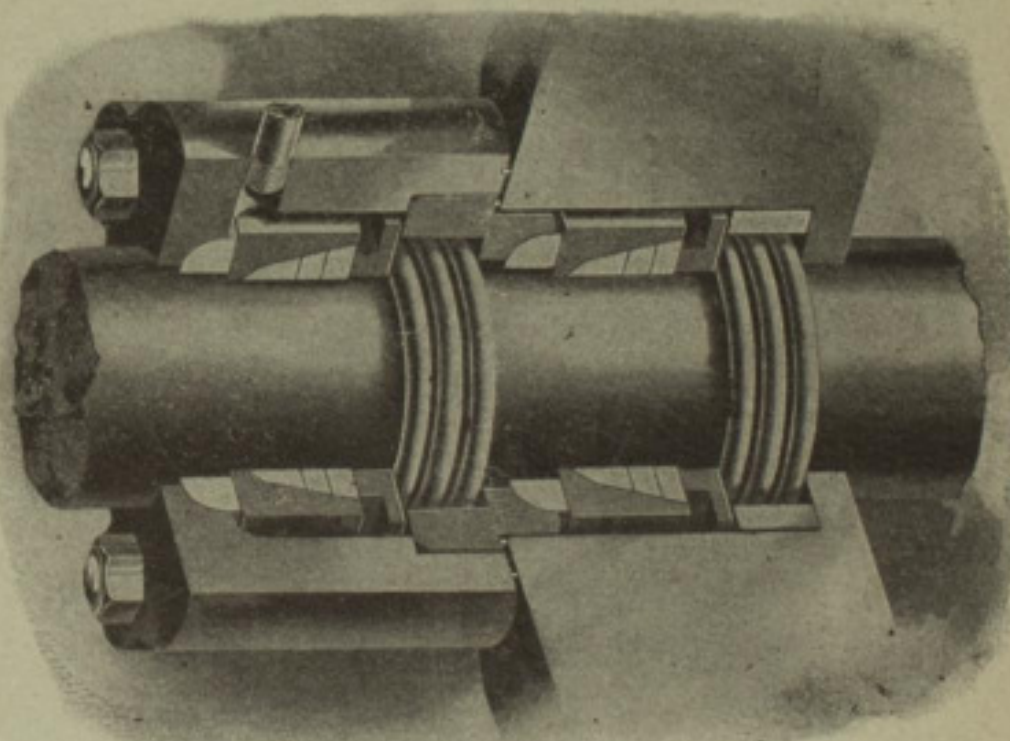
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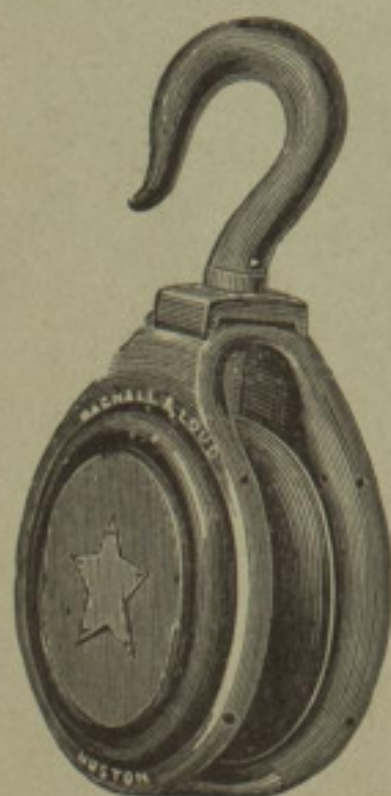
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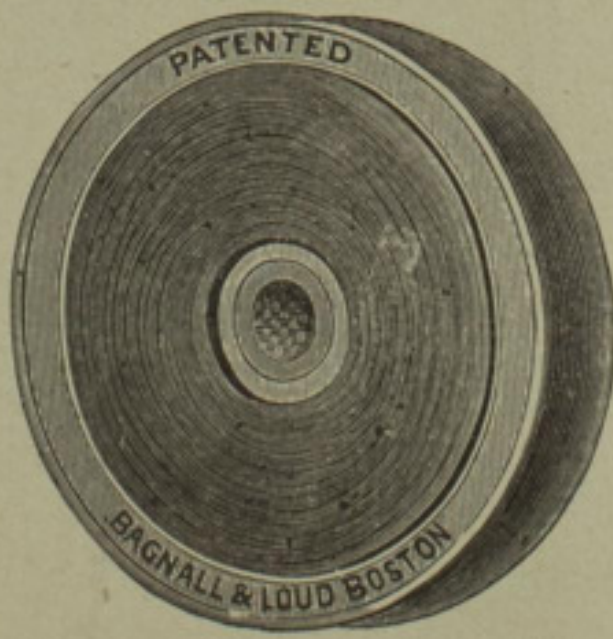


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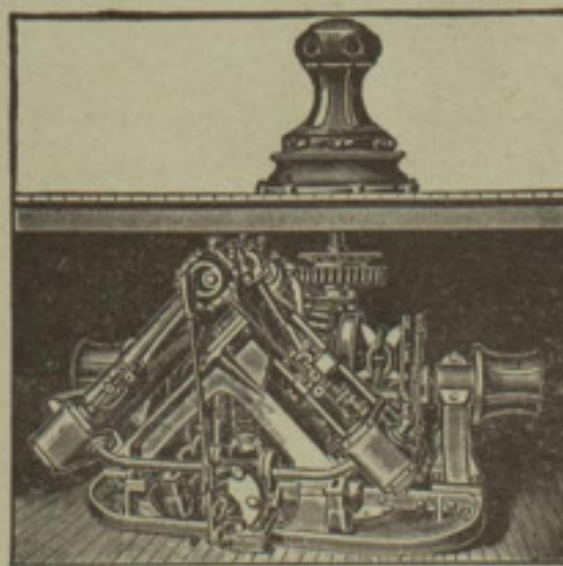
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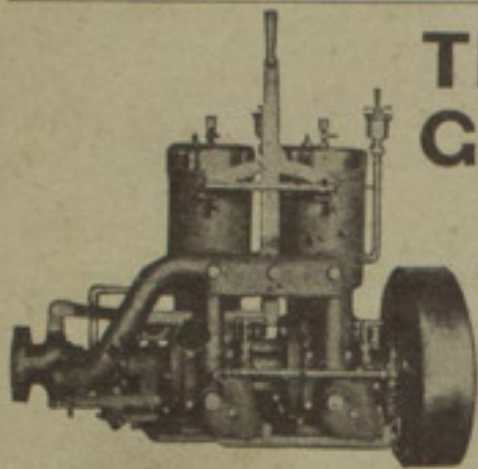


# MARINE REVIEW

VOL. XXIII.

CLEVELAND, O., APRIL 11, 1901.

No. 15.



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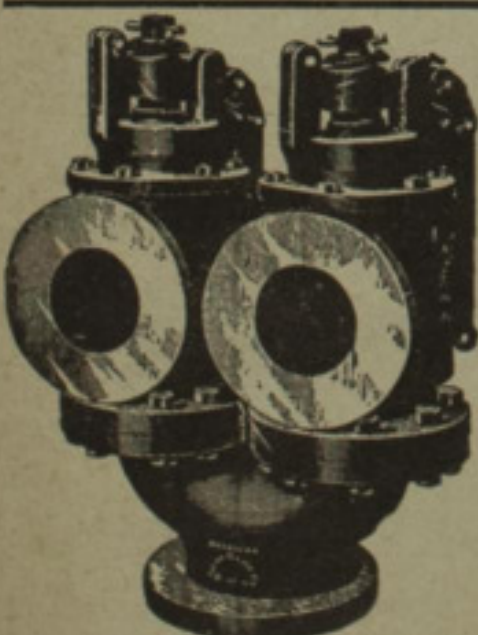
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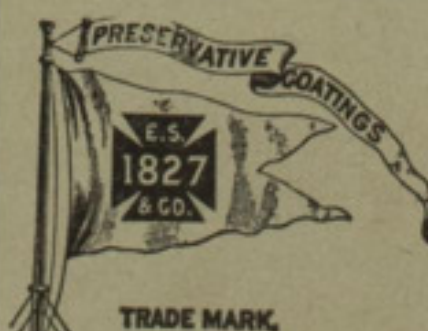
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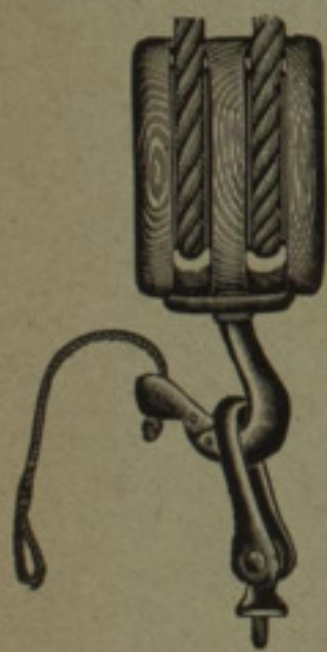
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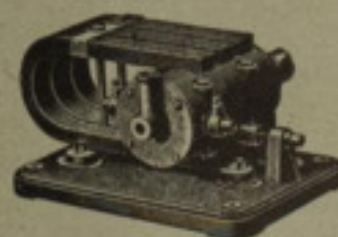
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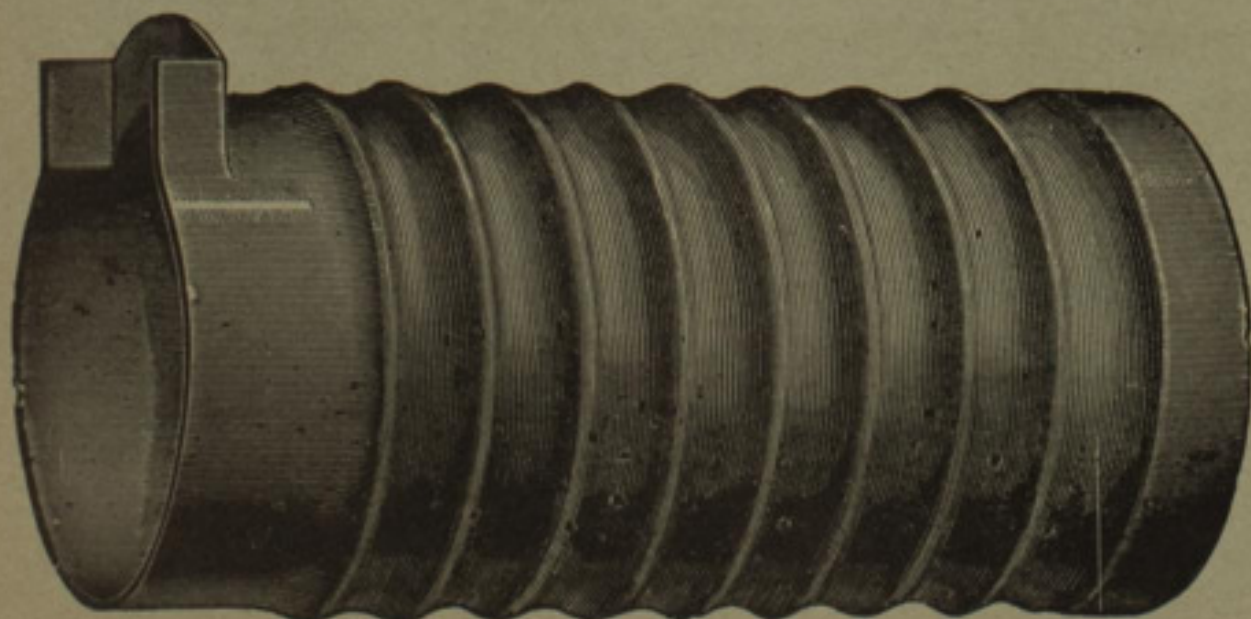
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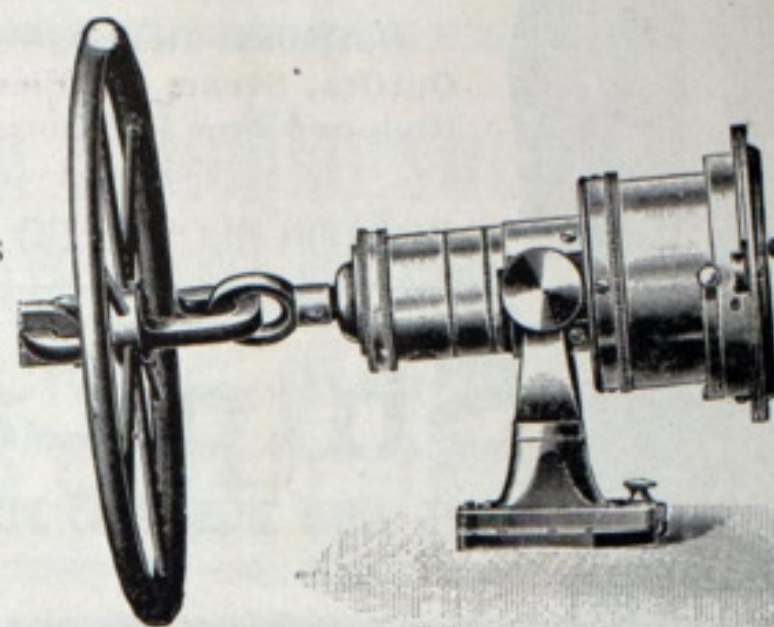
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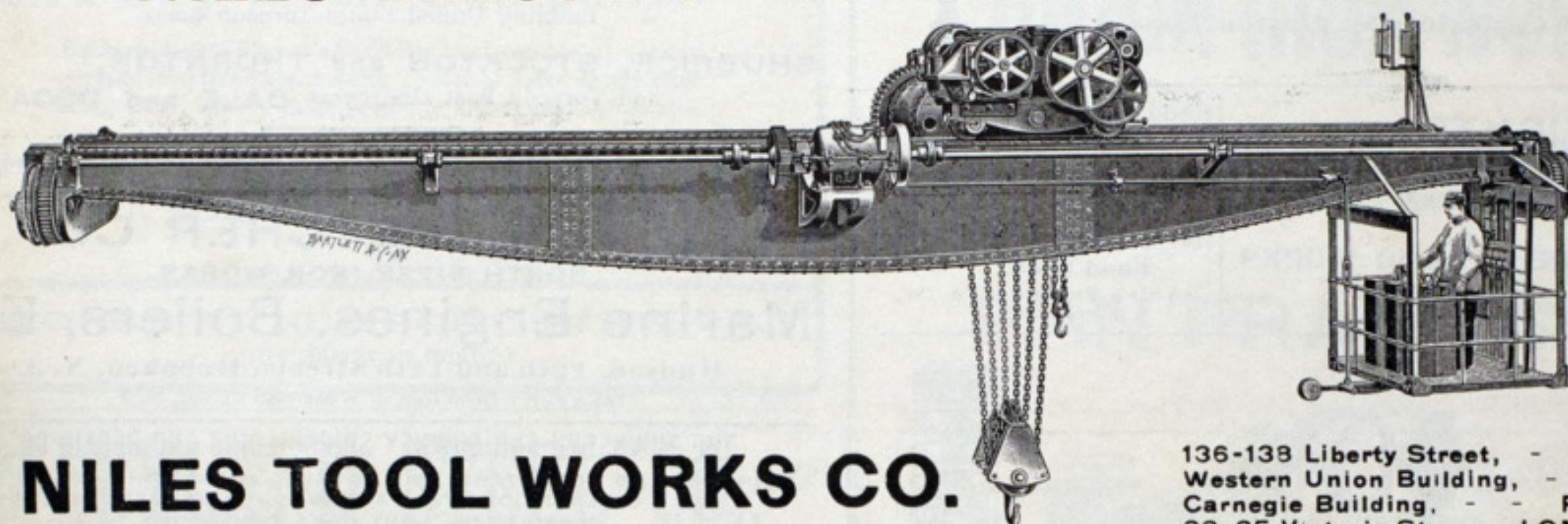
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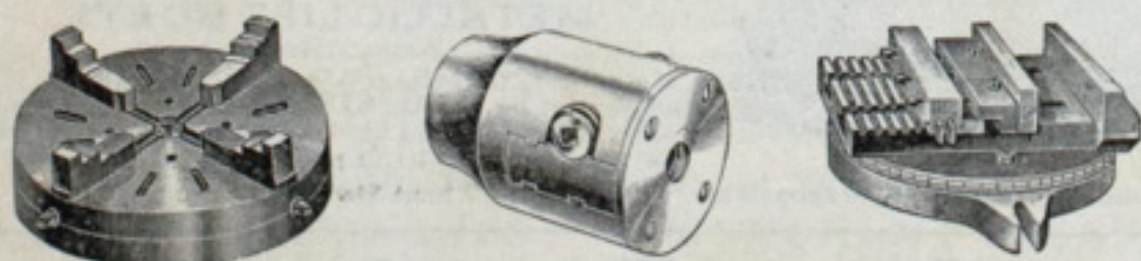
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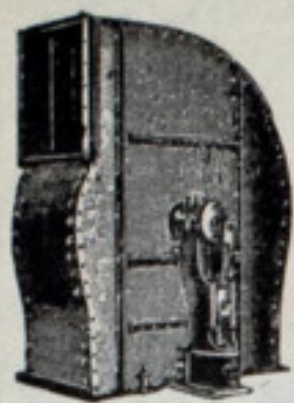
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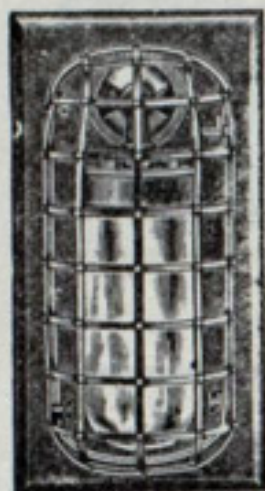
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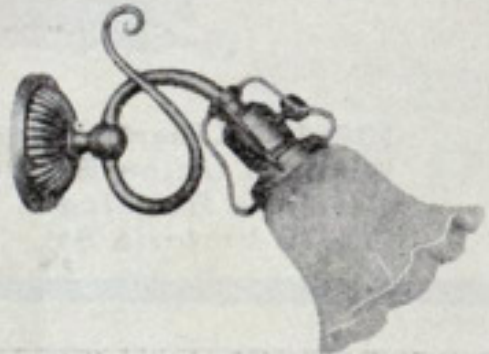
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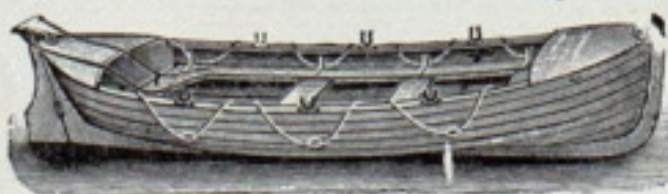
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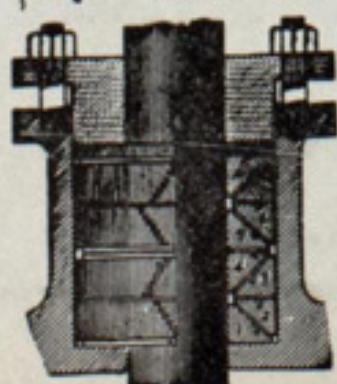
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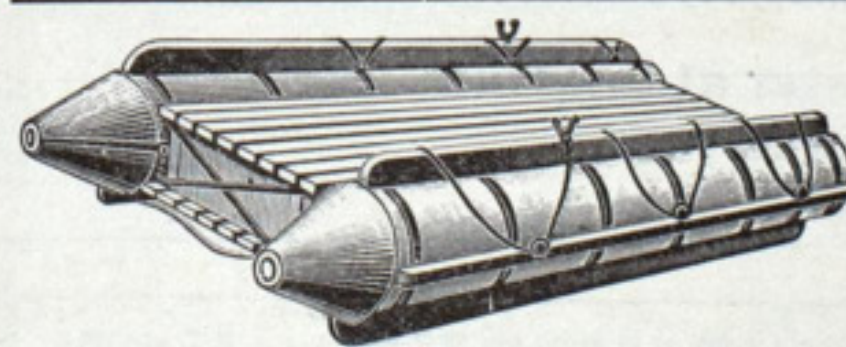
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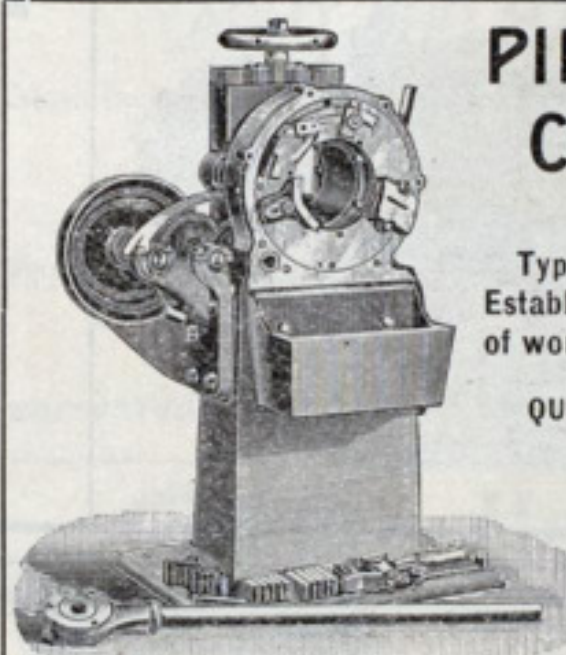
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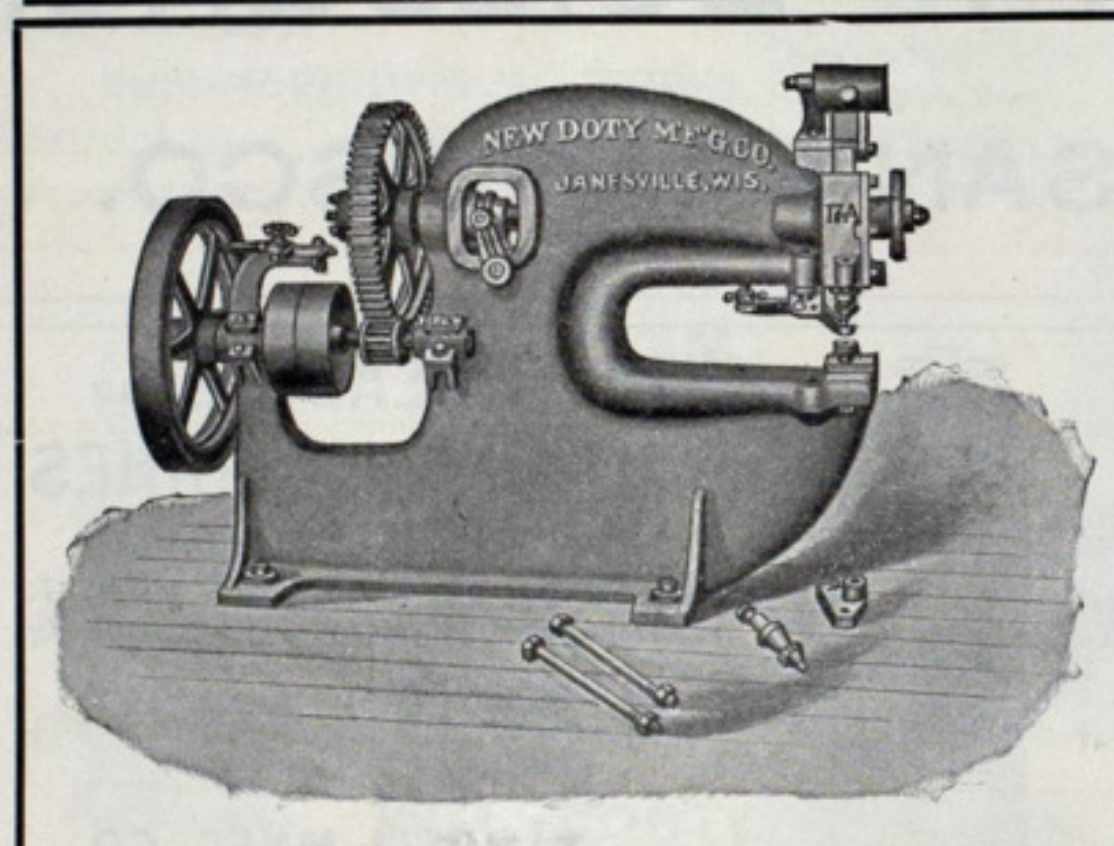
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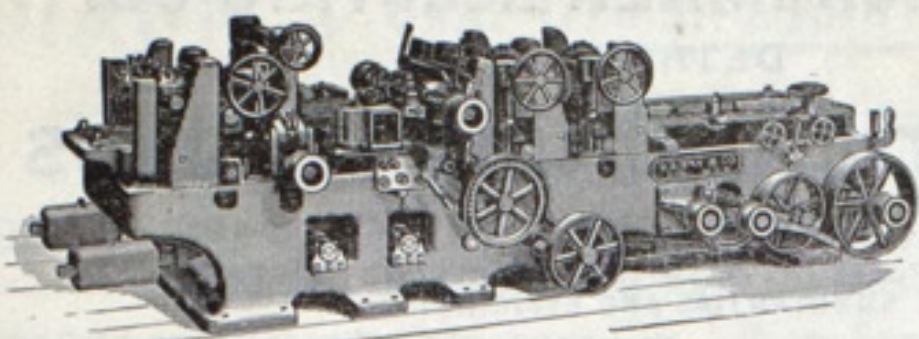
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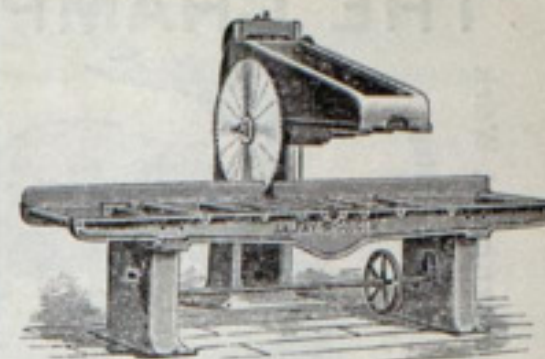
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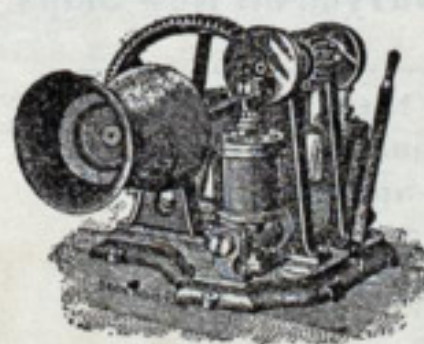
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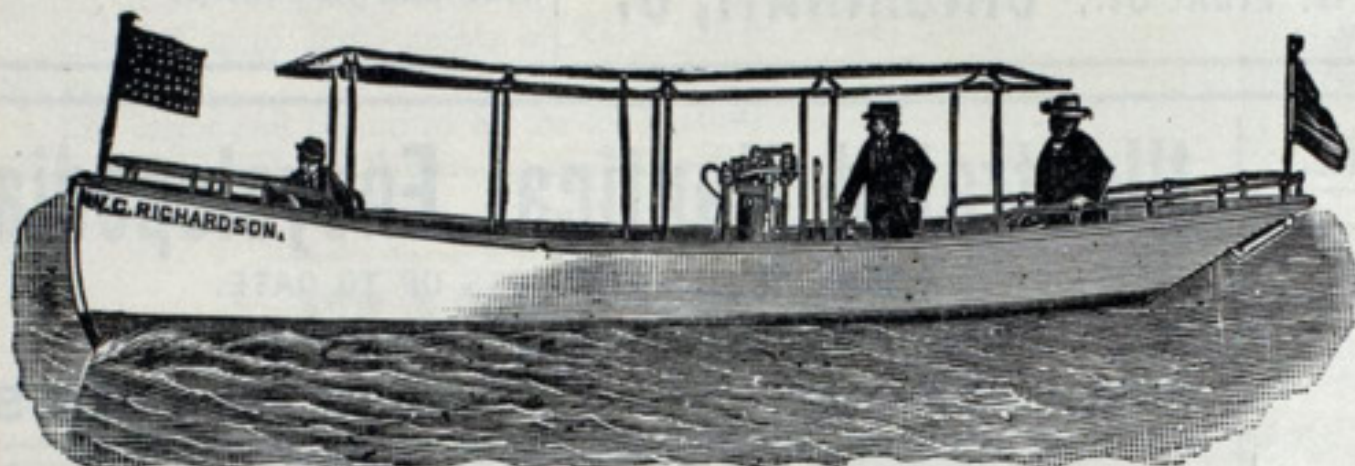
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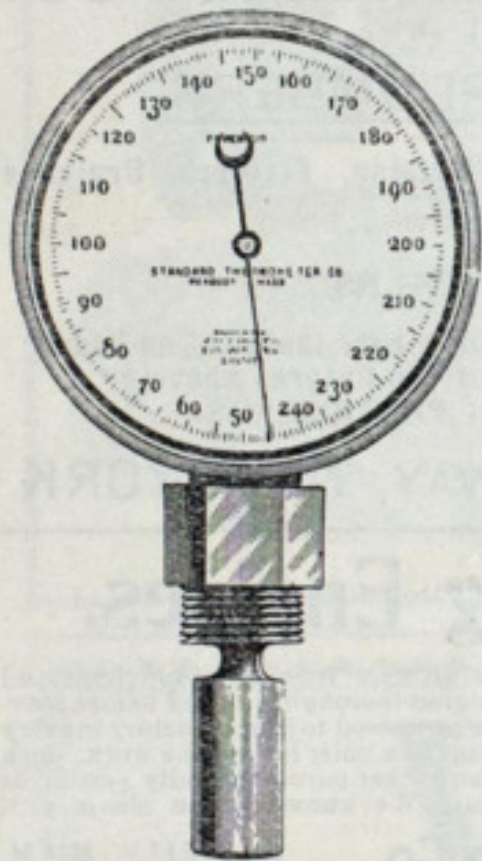
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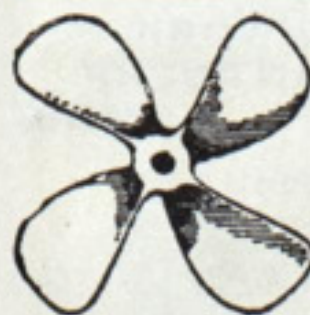
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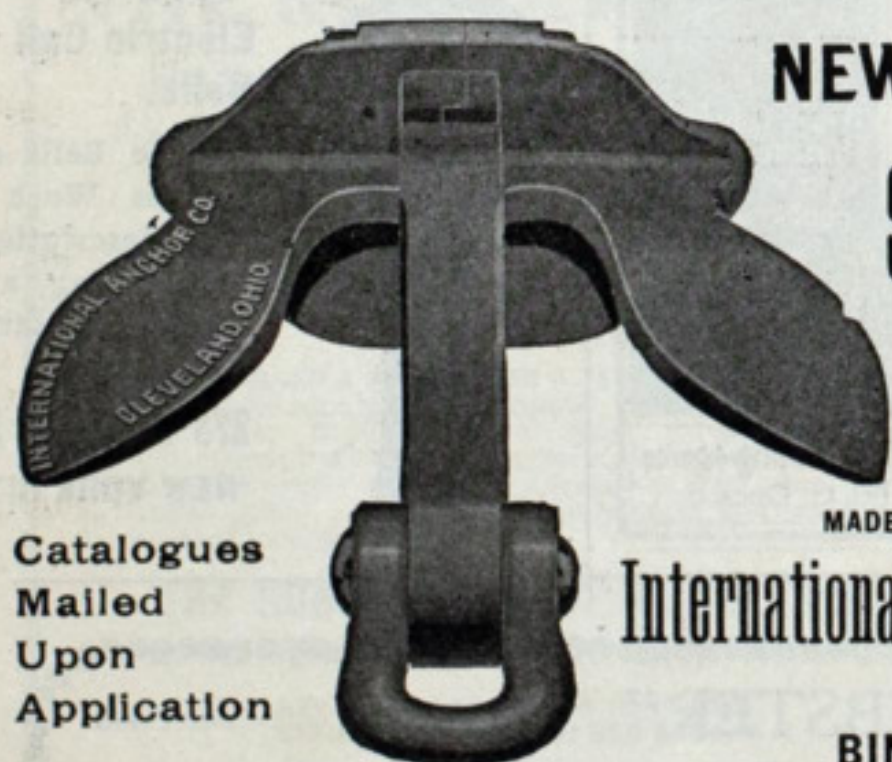
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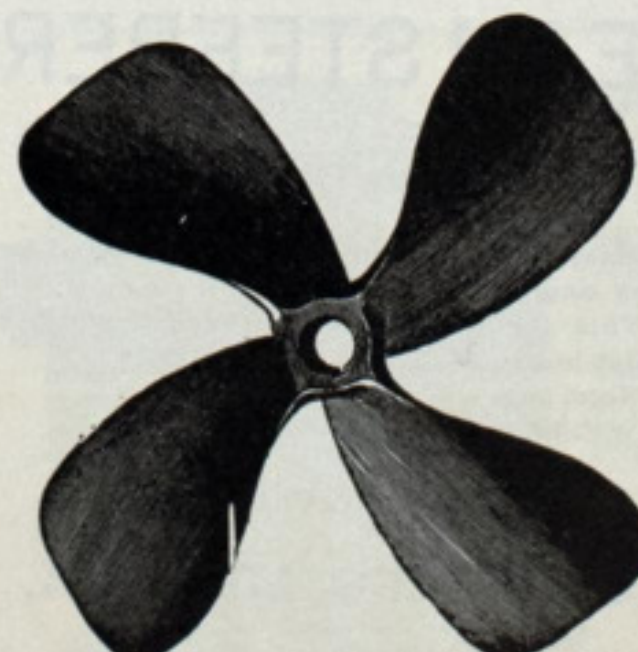
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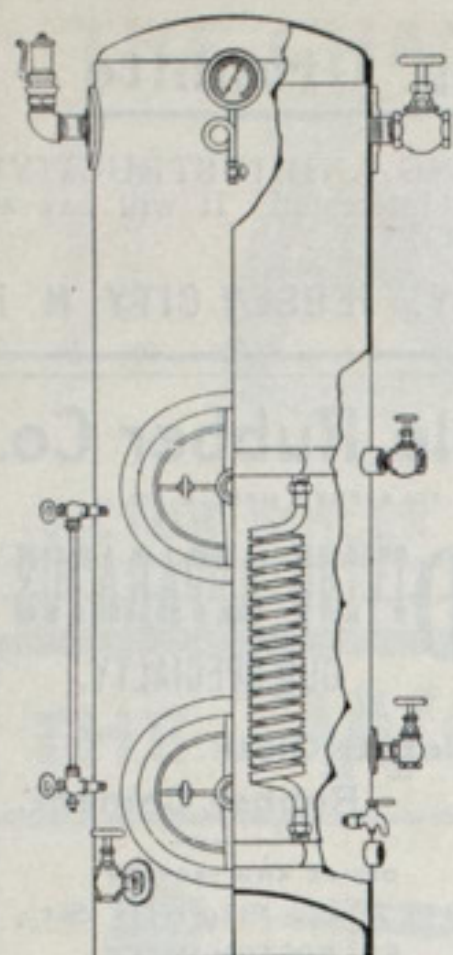
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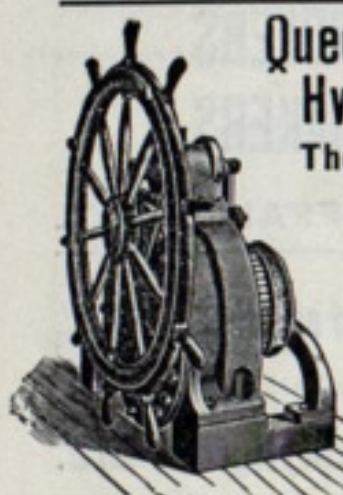
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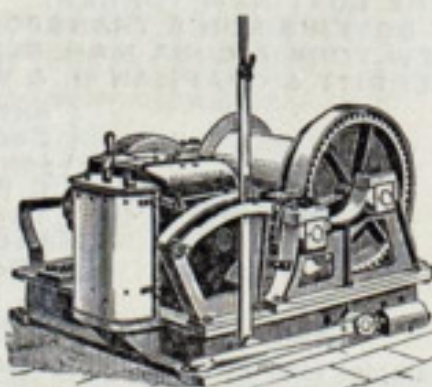
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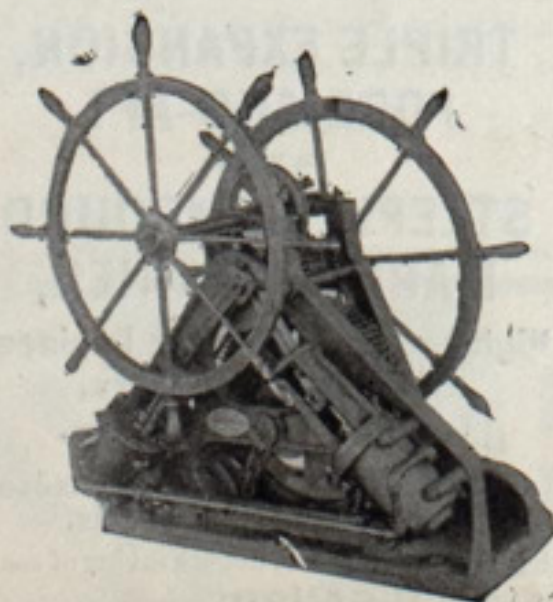
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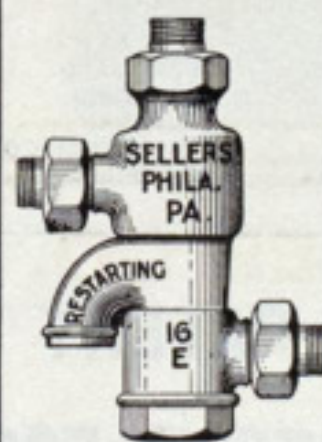
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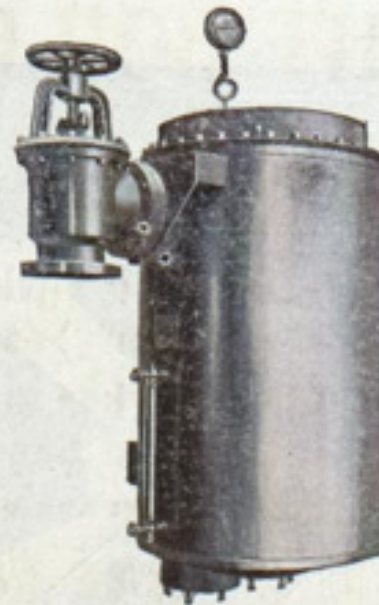
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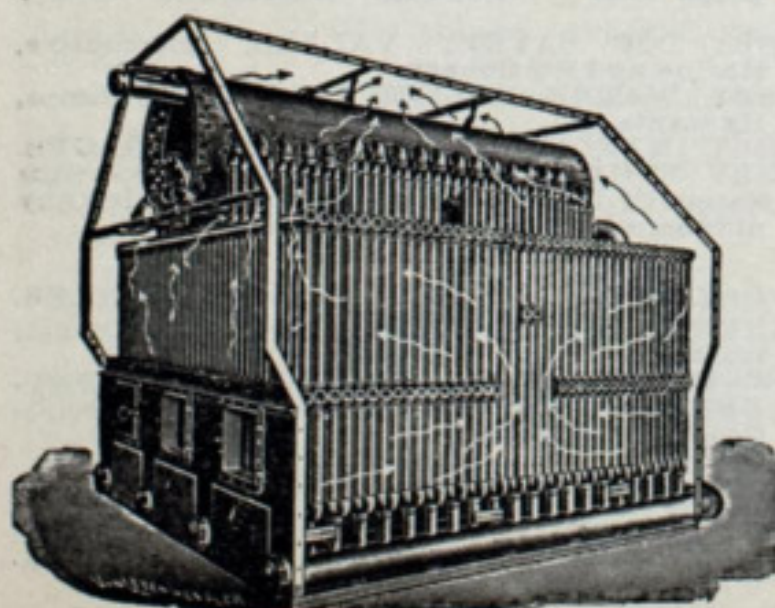
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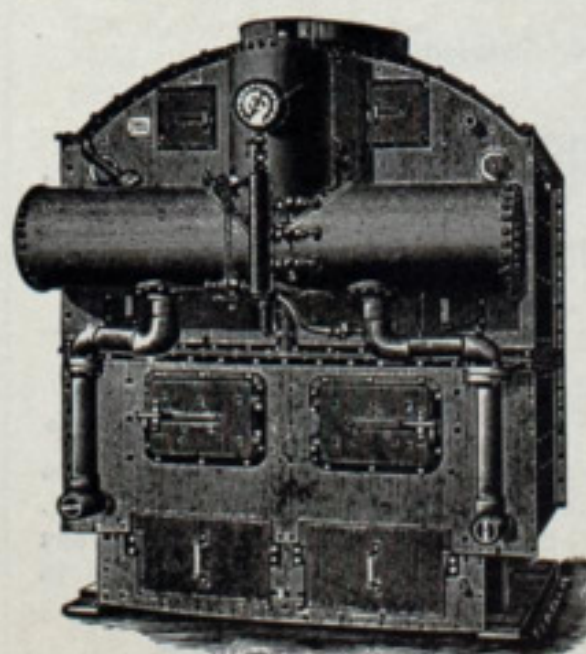
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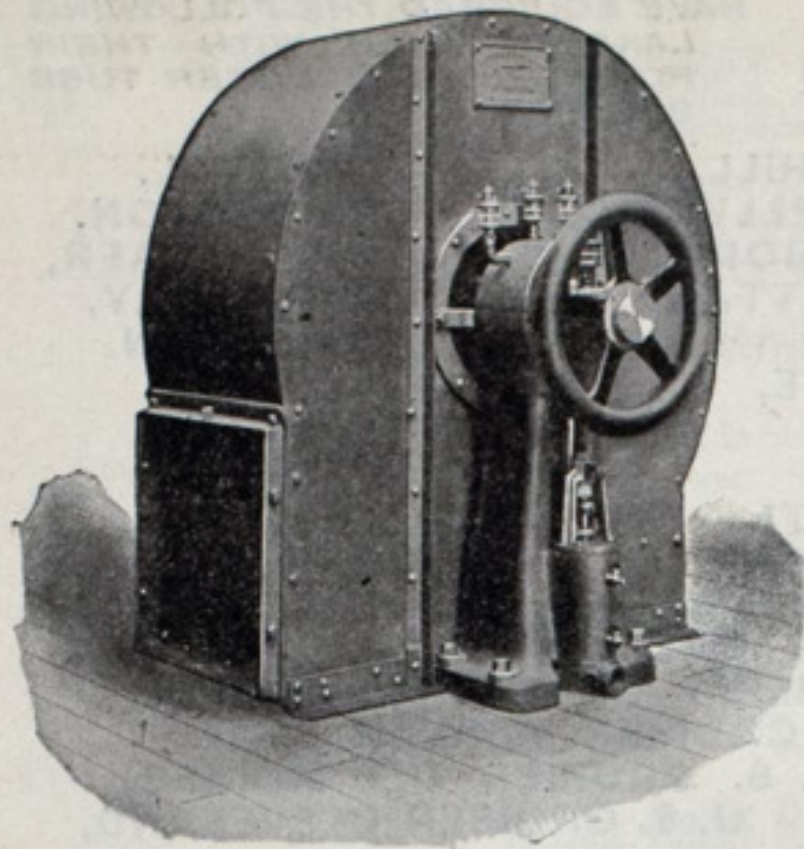
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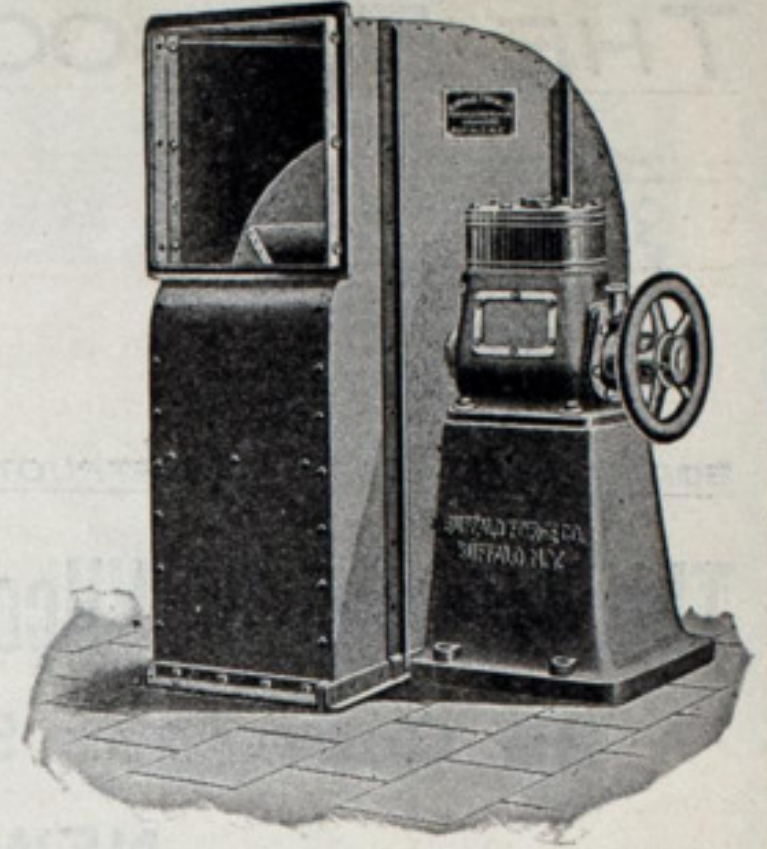
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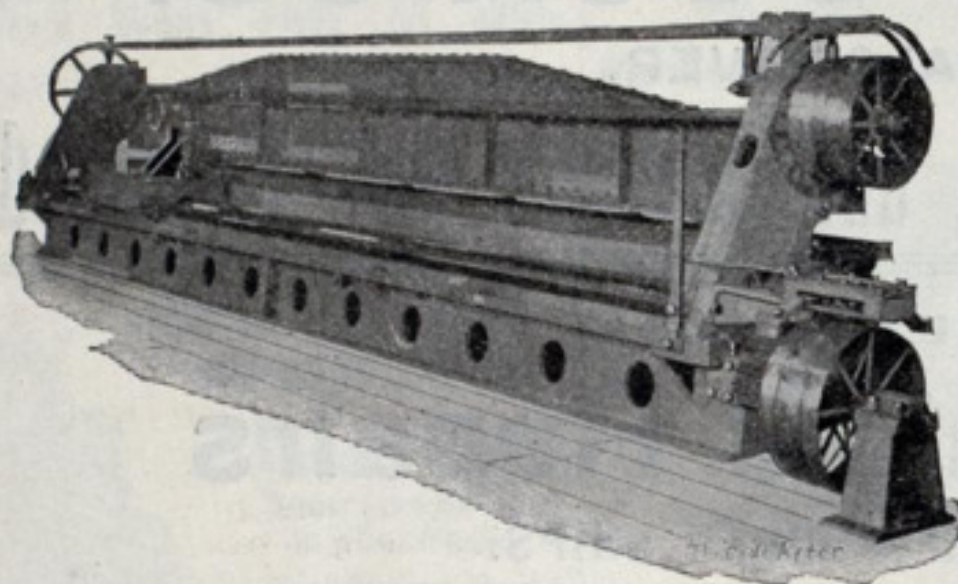
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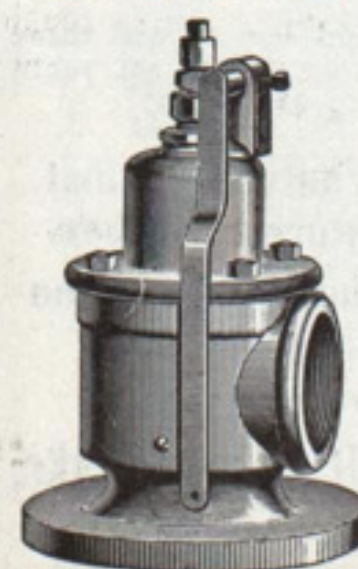
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